



Air Force Institute of Technology

Research Report 2018

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Graduate School of Engineering and Management

GRADUATE SCHOOL OF ENGINEERING AND MANAGEMENT
AIR FORCE INSTITUTE OF TECHNOLOGY
WRIGHT-PATTERSON AIR FORCE BASE, OHIO

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AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

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Air Force Institute of Technology Research Report 2018 Foreword

Research programs at the Air Force Institute of Technology (AFIT) are aligned with national defense priorities and provide valuable technical and management experiences that enhance our graduates' performance throughout their careers. AFIT works closely with research sponsors from many Air Force and DOD organizations to identify high interest problems that match our faculty expertise and educational requirements to maximize value.

AFIT's Autonomy and Navigation Technology Center, Center for Cyberspace Research, Center for Directed Energy, Center for Operational Analysis, Center for Technical Intelligence Studies and Research, Center for Space Research and Assurance and other research groups serve as focal points for many of our research initiatives. Emerging research groups are addressing game-changing technologies including hypersonics, human-machine systems, data sciences, and developing defense-related additive manufacturing applications. AFIT advises over 40 major acquisition programs through the Scientific Test & Analysis Techniques Test & Evaluation Center of Excellence to achieve maximum effectiveness of test resources. New consultation efforts include exploration of multi-domain approaches to the Air Force's core missions.

AFIT has strategic partnerships with the Air Force Research Laboratory, the National Air and Space Intelligence Center, the Air Force Life Cycle Management Center, the United States Transportation Command, and many other organizations and operational communities to maximize the contributions of our research programs to national defense needs. Our faculty and students also engage in collaborations with researchers at universities throughout the nation to advance the state-of-the-art in a variety of disciplines. AFIT cooperates with commercial enterprises to ensure timely transfer of new technology to US industry through Cooperative Research and Development Agreements (CRADAs).

This Research Report is prepared annually to summarize the significant contributions of AFIT; to solicit continued involvement and support from our Air Force, DOD, and other federal partners; and to encourage new sponsors to participate in AFIT's research programs. AFIT welcomes new opportunities to engage in research projects that are of mutual interest to our customers, faculty, and students. Additional information is available at <http://www.afit.edu/ENR/>.

Heidi R. Ries, Ph.D.
Dean for Research
Graduate School of Engineering
and Management
Air Force Institute of Technology



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1. INTRODUCTION

1.1. OVERVIEW

This Research Report presents the FY18 research statistics and contributions of the Graduate School of Engineering and Management (EN) at AFIT. AFIT research interests and faculty expertise cover a broad spectrum of technical areas related to USAF needs, as reflected by the range of topics addressed in the faculty and student publications listed in this report. In most cases, the research work reported herein is directly sponsored by one or more USAF or DOD agencies.

AFIT welcomes the opportunity to conduct research on additional topics of interest to the USAF, DOD, and other federal organizations when adequate manpower and financial resources are available and/or provided by a sponsor. In addition, AFIT provides research collaboration and technology transfer benefits to the public through Cooperative Research and Development Agreements (CRADAs). Interested individuals may discuss ideas for new research collaborations, potential CRADAs, or research proposals with individual faculty using the contact information in this document or via the AFIT Directory at http://www.afit.edu/directory_search.cfm.

Additional information on the research programs at AFIT may also be found on the research web home page at <http://www.afit.edu/ENR/>. The Office of Research and Sponsored Programs, Graduate School of Engineering and Management can be reached at 937-255-3633, (DSN 785-3633) or by email: research@afit.edu. The primary points of contact are Ms Bobbie J. Bowling, the Director of Sponsored Programs, 937-255-3636 x4396, DSN 785-3636 x4396 and Dr. Heidi R. Ries, Dean for Research, 937-255-3636 x4544, DSN 785-3636 x4544.

1.2. THE GRADUATE SCHOOL OF ENGINEERING AND MANAGEMENT RESEARCH COLLABORATION

As detailed in the 2018-2019 catalog at <https://www.afit.edu/docs/2018-2019%20AFIT%20Graduate%20Catalog.pdf>, AFIT offers Master's and Doctoral programs in a variety of disciplines through six departments: Department of Aeronautics and Astronautics (ENY), Department of Electrical and Computer Engineering (ENG), Department of Engineering Physics (ENP), Department of Mathematics and Statistics (ENC), Department of Operational Sciences (ENS), and Department of Systems Engineering and Management (ENV). In all of these disciplines, research is an integral component of graduate education, developing an individual student's skills and providing new knowledge of interest to many.

A brief listing of each department's research areas of emphasis appears below. Please contact the faculty or relevant departmental office for further information, or visit the Graduate School of Engineering and Management departmental websites at <http://www.afit.edu/en/>.

The [Department of Aeronautics and Astronautics](#), as well as its resident **Center for Space Research & Assurance**, invites research topic proposals and collaborative suggestions for the Aeronautical Engineering, Astronautical Engineering, Materials Science, and Space Systems programs. The following list highlights the Department's research specialties:

Aeroelasticity and Design Optimization
Aerospace Structures and Materials
Aircraft Survivability
Autonomous Control of UAVs
Compact Combustor Development
Computational Fluid Dynamics
Control of High Performance Aircraft
Dynamic Flight Simulation
Experimental Fluid Dynamics
High Velocity Impact
Impact Dynamics
Inflatable Space Structures
Materials and Structural Analysis

Mechanics of Materials and Structures
Micro Air Vehicles
Non-Linear Dynamics
Re-entry Dynamics
Rocket & Space Propulsion
Rotocraft Aeromechanics
Satellite Cluster Dynamics, Navigation, & Control
Spacecraft Dynamics & Control
Spacecraft/Sensor Integration and Testing
Thermal Control of Spacecraft
Turbine Heat Transfer
Weapon Aerodynamic

The [Department of Electrical and Computer Engineering](#), as well as its resident the **Autonomy and Navigation Technology Center** and the **Center for Cyberspace Research**, invites research topic proposals and collaborative suggestions for the Electrical Engineering, Computer Engineering, Computer Science, Cyber Operations, and Cyber Warfare programs. The following list highlights the Department's research specialties:

Artificial Intelligence
Automatic Target Recognition
Communications/Radar
Computer Architecture
Computer Communication Networks
Cryptography
Cyber Operations and Security
Electromagnetics/Low Observables
Electro-Optics
Electronic Warfare
Evolutionary Algorithms

Guidance, Navigation, and Control
Hardware Assurance
Information Visualization
Micro- and Nanosystems
Navigation Warfare
Parallel and Distributed Processing
Security-Focused Computing
Sensor Networks
Signal and Image Processing
Software Protection
Wireless Networks

The [Department of Engineering Physics](#), as well as its resident **Center for Directed Energy** and **Center for Technical Intelligence Studies and Research**, invites research topic proposals and collaborative suggestions for the Applied Physics, Nuclear Engineering, Optical Sciences and Engineering, Materials Science (jointly operated with the Department of Aeronautics and Astronautics), and Combating Weapons of Mass Destruction programs. The following list highlights the Department's research specialties within these programs:

Adaptive Optics, Aero-Optics and Beam Control
Atmospheric Characterization and Compensation
Atmospheric Effects on Weapons Systems
Atmospheric Electricity
Aviation Weather Forecasting
Biological and Chemical Weapon Technologies
Computational Physics
Defects in Crystalline Solids
Directed Energy Weapons Effectiveness
High Energy Density Physics
Imaging Science
Lasers and Electro-Optics
Muon Detection
Materials – Bio, Nuclear and Sensor
Microscopic Imaging of Surfaces
Modeling and Simulation of Atmospheric Effects
Molecular Reaction Dynamics

Nanomaterials
Nanomechanics
Nuclear Forensics
Nuclear Survivability
Nuclear Weapons Effects
Numerical Weather Prediction
Physics-Based Scene Modeling
Positron Spectrometry
Radiation and Particle Detection
Radiation Effects on Materials and Electronics
Radiation Transport
Remote Sensing and Signature Analysis
Satellite Meteorology
Semiconductors
Space Physics
Tropical Cyclone Analysis and Forecasting
Weather Radar

The [Department of Mathematics and Statistics](#) invites research topic proposals and collaborative suggestions for the following research specialties:

Artificial Intelligence/Autonomy
Acoustic Wave Scattering
Bayesian Analysis
Biostatistics
Categorical Data Analysis
Control Theory
Constraint Programming
Data Analytics
Design of Experiments
Electromagnetics
Fluid Dynamics
Human Performance
Information Fusion

Narrative Analysis
Network Analysis
Nonlinear Waves
Numerical Analysis
Optimization
Partial Differential Equations
Rarefied Gas Dynamics
Regression Modeling
Stochastic Processes
Structural Health Monitoring
Wavelets

The [Department of Operational Sciences](#), as well as its resident **Center for Operational Analysis**, invites research topic proposals and collaborative suggestions within the areas of Operations Research, Logistics, and Supply Chain Management programs. The following list highlights the Department's research specialties:

Agile Combat Support Prioritization
Automatic Target Recognition
Autonomous System Operations and Testing
Big Data and Analytics
Combat Modeling
Decision Analysis
Design and Analysis of Experiments
Enterprise Level Depot Sustainment
Evaluation of Autonomous Systems
Facility Location Optimization
Force Structure Analysis Tool Development
Information Modeling
Inventory Analysis
Irregular Warfare
Irregular Warfare Model Development
Lean Operations
Logistics
Machine Learning
Maintenance and Production Management
Managerial Economics
Manpower Modeling and Forecasting
Materials Research Test Planning
Mathematical Programming
Modeling and Simulation

Network Analysis
Neural Networks
Operations Management
Operations Research
Optimization
Organization Behavior
Petroleum Management
Repair Network Integration
Robust Decision Making
Robust Design
Robust Mobility Modeling
Scheduling
Service Operations Management
Social Network Modeling and Analysis
Statistical Process Monitoring
Stochastic Modeling
Strategic Sourcing
Supply Chain Management and Resource Optimization
Test and Evaluation
Test Science
Time Series Analysis
Transportation Policy and Strategic Modeling

The [Department of Systems Engineering and Management](#) is a multidisciplinary department offering graduate degrees in seven different majors and conducting research in collaboration with the wide spectrum of programs throughout AFIT. The mission of the Department is to provide defense-focused graduate education and engage in interdisciplinary research to achieve integrated solutions to current and future Air Force challenges and enhance the interface between technology and human resources by focusing on systems, processes, and management. The following list highlights the Department's research specialties:

Acquisition Learning Curves
Agile Software Systems Engineering
Applied Environmental Sciences
Built Environment Microbiome
Complex Systems
Computer and Network Security
Construction Management
Cost Analysis
Cyber Attack on UAS
Data Analytics
Database Design & Analysis
Decision Analysis
Design and Analysis of Experiments
Ecological Engineering
Economics
Economic Decision Analysis
Emergency Management
Energy Systems Engineering
Engineering Economics
Experimental Flight Test

Facility and Infrastructure Management
Fuels Microbiology
Geographical Information Science
Human Systems Integration
Human-Agent Interaction
Indoor Air Quality
Information Assurance and Security
Infrastructure Asset Management
Innovation and Creativity
Interoperability
Installation Resilience
Knowledge Management
Leadership
Model-Based Systems Engineering
Modeling and Simulation
Multi-objective Optimization
Neck Injury Biomechanics
Occupational Aerosol Exposure Assessment and Control
Occupational Exposure Assessment Strategies

Occupational Noise Exposure Assessment and Control
Occupational/Environmental Exposures
Operations Research
Organizational Change
Permafrost
Photovoltaics
Physiologically-Based Pharmacokinetic Modeling Analysis
Product Design and Development
Project Management
Project Delivery
Quantum Cryptography and Information
Reliability Engineering
Resiliency

Risk and Uncertainty Analysis
Risk Management
Strategic Decision Support
Structural Health Monitoring
Structural Performance
Surface Science
Sustainability and Life Cycle Assessment
System Acquisition
System Architecture
Systems Engineering
Unmanned Air System Design and Test
Vigilance
Water and Energy Sustainability
Water Quality
Waste-to-Energy Conversion Modeling

Another avenue for educational and research collaboration with the Graduate School of Engineering and Management is through association with one or more of **AFIT's Research Centers**. A brief listing of each Center's research or educational areas of emphasis appears below. Please contact the Centers directly (see Chapter 6) or visit <http://www.afit.edu/ENR/page.cfm> for further information.

The **Autonomy and Navigation Technology (ANT) Center** is a forward-looking research center seeking to identify and solve tomorrow's most challenging navigation and autonomous and cooperative control problems by focusing on three research thrusts: autonomous and cooperative systems, non-GPS precision navigation, and robust GPS navigation/NAVWAR.

The **Center for Cyberspace Research (CCR)** conducts cyber security and cyber operations research at the Master's and PhD levels. CCR affiliated faculty teach and direct graduate research focusing on understanding and developing advanced cyber-related theories and technologies, such as critical infrastructure protection, cyber-physical systems, network intrusion detection and avoidance, insider threat mitigation, cyberspace situational awareness, malicious software detection and analysis, software protection, and anti-tamper technologies. The CCR is forward-looking and responsive to the changing educational and research needs of the Air Force, Department of Defense, and the federal government. CCR faculty's research and teaching establishes AFIT as a national Center of Academic Excellence in Research (CAE-R) and Center of Academic Excellence in Cyber Operations (CAE-CO), designated by the Department of Homeland Security (DHS) and the National Security Agency (NSA).

The **Center for Directed Energy (CDE)** is dedicated to Air Force and DOD research in high energy lasers (HELs), high power microwaves (HPMs), and their enabling technologies. The Center is an advocate for transitioning these systems to the battlefield through vigorous scientific and engineering research, graduate education programs and diverse consulting activities.

The **Center for Operational Analysis (COA)** conducts defense-focused research which directly supports DOD strategic objectives. The COA applies rigorous quantitative and qualitative tools, methodologies and approaches to identify, analyze and solve complex operations and supply chain problems while developing critical and forward-thinking analysts, managers, and leaders.

The **Center for Space Research and Assurance (CSRA)** is focused on delivering highly-valued resilient, responsive and reliable space capabilities to the DOD and Intelligence Community through executing cutting-edge space technology development, science and space experiments in collaboration with government organizations, to meet the challenges of tomorrow by developing the technical space cadre through world-class research and immersive hands-on graduate education.

The **Center for Technical Intelligence Studies and Research (CTISR)** is focused on Air Force, DOD and Intelligence Community's scientific, technical and operational activities through graduate research programs. Activities are directed on improving technical intelligence gathering via remote sensing. Current research is focused on signature measurement, phenomenological understanding, and algorithm development for target detection and tracking, battle space combustion characterization, event classification, and material identification.

The **Center of Excellence (COE) for Scientific Test and Analysis Techniques (STAT) in Test & Evaluation (T&E)** is a reach-back T&E capability that provides advice and assistance in the application of scientific test and analysis techniques in the development of Test & Evaluation Master Plans (TEMP). The COE provides value to the PEOs/PMs across the DOD through assistance provided to the Chief Developmental Tester (T&E Program Leads) during the T&E planning, execution and assessment. The COE provides an additional resource of subject matter expertise for the program managers and chief developmental testers of Major Defense Acquisition Programs (MDAP) and Major Automated Information Systems (MAIS) during the T&E planning, execution, and assessment process.

2. SPECIAL RECOGNITIONS

2.1 FACULTY FELLOWS

BADIRU, ADEDEJI B., Dean, Graduate School of Engineering and Management, Fellow of the Institute of Industrial Engineers, Fellow of the Nigerian Academy of Engineering.

COLLINS, PETER J., Professor of Electrical Engineering, Department of Electrical and Computer Engineering, Fellow of Antenna Measurement and Techniques Association.

DECKRO, RICHARD F., Professor of Operations Research, Department of Operational Sciences, Fellow of the Military Operations Research Society.

***ELROD, WILLIAM E.**, Professor Emeritus of Aerospace Engineering, Department of Aeronautics and Astronautics, Fellow of American Society of Mechanical Engineers International.

***FRANKE, MILTON E.**, Professor Emeritus of Aerospace Engineering, Department of Aeronautics and Astronautics, Fellow of the American Society of Mechanical Engineers.

GOLTZ, MARK N., Professor of Engineering and Environmental Management, Department of Systems Engineering and Management, Fellow of the Society of American Military Engineers.

GRMAILA, MICHAEL R., Professor and Head, Department of Systems Engineering and Management, Fellow of the Information System Security Association.

***HOUPIS, CONSTANTINE H.**, Professor Emeritus of Electrical Engineering, Department of Electrical and Computer Engineering, Fellow of the Institute of Electrical and Electronic Engineers.

MALL, SHANKAR, Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, Fellow of the American Society of Mechanical Engineers International.

***MAYBECK, PETER S.**, Professor Emeritus of Electrical Engineering, Department of Electrical and Computer Engineering, Fellow of the Institute of Electrical and Electronic Engineers.

PACHTER, MEIR, Professor of Electrical Engineering, Department of Electrical and Computer Engineering, Fellow of the Institute of Electrical and Electronic Engineers.

PALAZOTTO, ANTHONY N., Distinguished Professor, Aerospace Engineering, Department of Aeronautics and Astronautics, Fellow of American Institute of Aeronautics and Astronautics, Fellow of the American Academy of Mechanics, Fellow of the American Society of Civil Engineers, Fellow of the Engineering Mechanics Institute.

PIGNATIELLO, JOSEPH J., Professor of Operations Research; Head, Department of Operational Sciences, Fellow of the Institute of Industrial Engineers; Fellow of the American Society for Quality.

POLANKA, MARC D., Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, Fellow of the American Society of Mechanical Engineers International.

RAQUET, JOHN F., Associate Professor of Electrical Engineering, Department of Electrical and Computer Engineering, Fellow of the Institute of Navigation.

RUGGLES-WRENN, MARINA B., Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, Fellow of the American Society of Mechanical Engineers International.

TERZUOLI, ANDREW J., Associate Professor of Electrical Engineering, Department of Electrical and Computer Engineering, Fellow of the Electromagnetics Academy.

***TORVIK, PETER J.**, Professor Emeritus of Aerospace Engineering and Engineering Mechanics, Department of Aeronautics and Astronautics, Fellow of the American Institute of Aeronautics and Astronautics, Life Fellow of American Society of Mechanical Engineers International, Fellow of the Ohio Academy of Science.

*Emeritus faculty

2.2 PROFESSIONAL CERTIFICATIONS

AHNER, DARRYL K., Professional Engineer (Commonwealth of Virginia)

BADIRU, ADEDEJI B., Certified Project Management Professional (PMP), Leadership Certificate (University of Tennessee Leadership Institute), Professional Engineer (State of Oklahoma)

COX, AMY M., Lt Col, Remote Pilot Certificate, Federal Aviation Administration; Brevet, Experimental Flight Test Engineer, École du personnel Navigant d'essais et de reception; DAWIA, Test and Evaluation Certification, Level III; DAWIA, Program Management Certification, Level II

DRYLIE, SCOTT, Maj, Certified Defense Financial Manager – Acquisitions; Department of Defense Financial Manager Certification – Level 3; International Cost Estimating and Analysis Association Certified Cost Estimator/Analyst; Department of Defense Acquisition Career Development Program – Level II certification

CUNNINGHAM, WILLIAM A., Certified in Transportation and Logistics (CTL)

ENINGER, ROBERT M., Lt Col, Certified Industrial Hygienist

FASS, ROBERT D., Certified Cost Estimator/Analyst (International Cost Estimating and Analysis Association)

FREELS, JASON K., Maj, Systems Planning, Research, Development and Engineering (SPRDE) Certification, Level III

GREENDYKE, ROBERT B., Professional Engineer (State of Texas)

GOLTZ, MARK N., Board Certified Environmental Engineer (American Academy of Environmental Engineers), Professional Engineer (State of Minnesota)

GRMAILA, MICHAEL R., Certified Information Security Manager (CISM), Information Systems Audit and Control Association (ISACA); Certified Information System Security Professional (CISSP), International Information Systems Security Certification Consortium, Inc. (ISC)2; National Security Agency INFOSEC Assessment Methodology (IAM) Certification; National Security Agency INFOSEC Evaluation Methodology (IEM) Certification; National Security Agency Committee on National Security Systems (CNSS) 4011/4012/4013 Certification.

HARPER WILLIE F., Jr., Professional Engineer (State of Arizona)

HAZEN, BENJAMIN T., Maj, Certified Lean Six Sigma Black Belt, Certified Six Sigma Green Belt, Certificate in Transportation and Logistics Regulation, Certification in Transportation and Logistics (CTL)

HOISINGTON, ANDREW, J., Professional Engineer (State of Michigan)

***HOUPIS, CONSTANTINE H.**, Professional Engineer (State of Ohio)

KUNZ, DONALD L., Professional Engineer (Commonwealth of Virginia)

LUCAS, BRANDON, M., Certified Cost Estimator/Analyst (ICEAA), DOD Financial Management Level 3

MAILLOUX, LOGAN O., Maj, Certified Information System Security Professional (CISSP), Certified Systems Engineering Professional (CSEP)

MBONIMPA, ERIC G., Professional Engineer (State of Michigan)

PALAZOTTO, ANTHONY N., Professional Engineer (State of Ohio)

PARR, JEFFREY C., Lt Col, Systems Planning, Research, Development and Engineering (SPRDE) Certification, Level III

***QUINN, DENNIS W.**, Professional Engineer (State of Ohio)

REEDER, MARK F., Professional Engineer (State of Ohio)

RITSCHER, JONATHAN, Lt Col, APDP Business-Cost Estimation Certification, Level II

RUTLEDGE, JAMES L., Lt Col, Professional Engineer (State of Texas)

SCHULDT, STEVEN J., Professional Engineer (State of Ohio)

SLAGLEY, JEREMY M., Board Certified Industrial Hygienist, Board Certified Safety Professional

THOMAS, LEVI M., Maj, Professional Engineer (State of Colorado)

WAGNER, TORREY J., Lt Col, Certified Scaled Agile Framework Agilist; Systems Planning, Research, Development and Engineering (SPRDE) Science & Technology Manager Certification, Level III; SPRDE Systems Engineering Certification, Level III

2.3 RESEARCH AND TEACHING AWARDS

2.3.1 FACULTY

AKERS, BENJAMIN F.,

ENC Instructor of the Year, 2017-2018.

ANDERSON, JASON R.,

Southwestern Ohio Council for Higher Education (SOCHE), Faculty Excellence Award, 2018.

ARMSTRONG, ANDREW M., Maj,

ENC Instructor of the Quarter, 2017 Fall Quarter.

BREITBACH, TIMOTHY W.,

ASAM Instructor of the Year, 2018.

ENS Military Faculty Member of the Year, 2018.

CANCIANI, AARON J., Capt,

2018 John L. McLucas Basic Research Award

COBB, RICHARD G.,

2018 AIAA Dayton-Cincinnati Aerospace Sciences Symposium Best Presentation – Space Division

COLOMBI, JOHN M.,

IEEE Senior Member, March 2018.

DECKRO, RICHARD F.,

2017 J. Steinhardt Prize, Military Applications Society of INFORMS, 2017.

FREEMAN, JACOB A., Lt Col,

2018 SOCHE Faculty Excellence Award

HARPER, WILLIE F., Jr.,

Remerciements Award, April 2018 (presented by Theodore Dovi-Akue, Conference Chairperson), Salon International de l'Eau, de l'énergie, et al l'environnement, Lome, Togo, April 2018.

LINGENFELTER, ANDREW J., Capt,

2018 AETC Outstanding Scientist/Engineer of the Year Award (mid-career military category)

LUNDAY, BRIAN J.,

Richard H. Barchi Prize, Military Operations Research Society, 2018.

Southwestern Ohio Council of Higher Education (SOCHE), Faculty Excellence Award, 2017.

MILLER, MICHAEL E.,

Southwestern Ohio Council for Higher Education Faculty Excellence Award, Fall 2017.

NYKL, SCOTT L.,

Air Force Outstanding Scientist/Engineer, Junior Civilian Award – AETC Winner.

POLANKA, MARC D.,

2017 ASME Turbo Expo Heat Transfer Committee Best Paper Award – Presented at 2018 IGTI Conference, June 2018.

2018 AETC Outstanding Scientist/Engineer of the Year Award (senior civilian category)

2018 AIAA Dayton-Cincinnati Aerospace Sciences Symposium Best Presentation Award

PRIGGE, DIEDRICH V.,

Sigma Iota Epsilon 2017-2018 Instructor of the Year Award — Beta Chapter, March 2018.

REEGER, JONAH A., Maj,

SOCHE Faculty Excellence Award, November 2017

ENC Instructor of the Quarter, 2018 Winter Quarter.

RUGGLES-WRENN, MARINA B.,

2018 AIAA Dayton-Cincinnati Aerospace Sciences Symposium Best Presentation – Structures Division

2018 AIAA Dayton-Cincinnati Aerospace Sciences Symposium Art-in-Science (Photo Category) Award – 2nd Place

RUTLEDGE, JAMES L., Lt Col.,

2017 ASME Turbo Expo Heat Transfer Committee Best Paper Award – Presented at 2018 IGTI Conference, June 2018.

2018 AIAA Dayton-Cincinnati Aerospace Sciences Symposium Best Presentation

2018 AFIT Outstanding Military Faculty Award

2018 AFIT Educator of the Year

SCHULDT, STEVEN J.,

Air Force Winner, Arthur S. Flemming Award, Basic Science Category, 2018.

2.3.2 STUDENTS

BATEMAN, MARK G., Jr.,

2018 Dean's Award for the most exceptional master's thesis by a graduating student in the Department of Systems Engineering and Management. Thesis title: "Optimization of Geosynchronous Earth Orbit and Ascent Vehicle Space Situational Awareness via Parallel Evaluation of Executable Architectures"

BEYER, STEVEN M.,

2018 Dean's Award for the most exceptional master's thesis by a graduating student in the Department of Electrical and Computer Engineering. Thesis title: "Pattern-of-Life Modeling using Data Leakage in Smart Homes"

2018 Chancellor's Award for the most exceptional master's thesis by a graduating student. Thesis Title: "Pattern-of-Life Modeling using Data Leakage in Smart Homes"

BUTT, SPENCER A.,

2018 Dean's Award for the most exceptional master's thesis by a graduating student in the Department of Operational Sciences. Thesis title: "Cyber Data Anomaly Detection using Autoencoder Neural Networks"

BOHAN, BRIAN T.,

2018 AIAA Dayton-Cincinnati Aerospace Sciences Symposium Art-in-Science (video category) Award – 2nd Place

HEWITSON, SCOTT C.,

2018 International Cost Estimating and Analysis Association Thesis Award. Thesis title: "An Analysis of Stability Properties of Operating and Support Costs for Air Force Aircraft"

HUFF, RILEY,

2018 AIAA Dayton-Cincinnati Aerospace Sciences Symposium Best Presentation Award

2018 Dean's Award for the most exceptional master's thesis by a graduating student in the Department of Aeronautics and Astronautics. Thesis title: "Design, Buildup, and Testing of a Radial Rotating Detonation Engine for a Compact Auxiliary Power Unit"

KIM, DEBORAH B.,

2018 Project Management Institute's Martin and Adams Thesis Award. Thesis title: "An Analysis of the Estimate at Complete for Department of Defense Contracts"

KNISELY, ANDREW J.,

2017 Best student paper award, 1st Place. Antenna Measurement Techniques Association Conference, October 2017.

KROEGER, BRIAN G.,

2018 AIAA Dayton-Cincinnati Aerospace Sciences Symposium Art-in-Science (Photo Category) Award – 2nd Place

KUNICKI, JOSEPH,

2018 ES Thrust Area Charles Bleckmann Wingman Award, Outstanding Student Award which recognizes the student who best exemplifies outstanding academic achievement, leadership, and character.

MCCREA, JOHN P.,

2018 American Institute of Aeronautics and Astronautics Student Service Award. Thesis title: “Design of a Zero-Gravity, Vacuum-Based 3D Printer Robot for In-Space Satellite Assembly”

MERRIMAN, CAMERON,

2018 Dean's Award for the most exceptional master's thesis by a graduating student in the Department of Engineering Physics. Thesis title: “Modeling Ground Burst Electromagnetic Pulse for Nuclear Weapon Diagnostics”

NG, JUSTIN,

2018 Dean's Award for the most exceptional master's thesis by a graduating student in the Department of Mathematics and Statistics. Thesis title: “Radial Basis Function Generated Finite Differences for the Nonlinear Schrodinger Equation”

OKAMOTO, JAMES T.,

2018 AFIT Cost Estimator of the Year by SAF/FMC. Thesis title: “Air Force Installation Contracting Agency Category Management through Expenditure Profiling”

PRINCE, ERIC R.,

2018 AIAA Dayton-Cincinnati Aerospace Sciences Symposium Best Presentation – Space Division

PRY, GLEN E.,

2018 AIAA Dayton-Cincinnati Aerospace Sciences Symposium Best Presentation – Structures Division

RAMSEY, PHILIP A.,

2018 Graduate Engineering Management, Society of American Military Engineers Award for top scholastic/research. Thesis title: “Cost and Performance of High Performance Sustainable Buildings”

SANDERS, KEITH A.,

2018 AFIT Distinguished Graduate

2018 Liberty Mutual through the American Industrial Hygiene Association. Thesis title: “Radiological Decontamination in the Urban Environment Using an Irreversible wash-Aid Recovery System”

2018 Morton Lippmann Scholarship through the American Industrial Hygiene Association. Thesis title: “Radiological Decontamination in the Urban Environment Using an Irreversible wash-Aid Recovery System”

2018 Best student poster by AIHA Ionizing Radiation Committee and AIHA Emergency Preparedness and Disaster Response Committee. Sanders, K., Slagley, J., Magnuson, M., Kaminski, M., & Eninger, R. Radiological Decontamination in the Urban Environment Utilizing an Irreversible Wash-Aid Recovery System. Poster presentation at AIHCE, Philadelphia, PA, 21-23 May 2018.

SPAN, MARTIN T., III,

2018 Louis K. Polk National Defense Industrial Association Award which is given for exhibiting the highest standards of academic and professional accomplishment and through their research made a significant contribution toward strengthening the nation's industrial defense base. Thesis title: “Conceptual Systems Security Analysis Aerial Refueling Case Study”

WATERS, MICHAEL C.,

2018 AIAA Dayton-Cincinnati Aerospace Sciences Symposium Art-in-Science (video category) Award – 2nd Place

3. RESEARCH STATISTICS

3.1 RESEARCH AND CONSULTING OUTPUT MEASURES

There are measurable indicators of AFIT's contribution to the engineering and scientific community and AFIT's success in staying well informed of technical possibilities and scientific opportunities. These indicators include the number and quality of technical publications accepted by the editors of journals; the number of presentations accepted for regional, national and international conferences; the number of sponsor funded research projects conducted; and finally, the number of student Graduate Research Papers, MS theses, and PhD dissertations completed and submitted to the Defense Technical Information Center. For FY18, these output measures are shown in Tables 3.1a and 3.1b for the Departments and Centers, respectively.

Table 3.1a Faculty Research and Sponsored Programs Output, by Department

	Graduate School, by Department						
	Graduate School (EN) Total	Math & Stats (ENC)	Electrical & Comp Eng (ENG)	Engineering Physics (ENP)	Operational Sciences (ENS)	Sys Eng & Management (ENV)	Aeronautics & Astro (ENY)
Number of Faculty (FTE)*	136	17	35	26	17	22	19
Number of Research Faculty (FTE)	14	1	2	10	0	1	0
Refereed Publication Authorships**	255	36	35	68	31	49	36
Refereed Conferences on the Basis of Full Paper Review**	198	11	87	41	13	23	23
Refereed Conferences on the Basis of Abstract Review**	233	11	22	91	44	21	44
Sponsor Funded Projects***	217	9	58	47	36	14	53
Books & Chapters in Books**	13	0	4	1	1	7	0
Patents****	8	0	4	2	0	1	2
Doctoral Dissertations Advised	35	3	9	8	5	1	9
Master's Theses Advised	249	8	54	24	61	49	53
Graduate Research Papers Advised	25	0	0	0	25	0	0

*FTE: Full-time equivalent military and permanent civilian faculty

**Publications/Presentations are counted by faculty authorships.

***One project associated with the Office of Research and Sponsored Programs (ENR) is reflected in Graduate School (EN) Total.

****Includes: Patents awarded, patent applications, and invention disclosures counted by faculty authorships.

Table 3.1b Faculty Research and Sponsored Programs Output, by Center

	Graduate School, by Center						
	Center Total	ANT	CCR	CDE	COA	CSRA	CTISR
Number of Affiliated Faculty*	139	27	22	17	12	43	18
Refereed Publication Authorships**	43	15	2	13	3	7	3
Refereed Conferences on the Basis of Full Paper Review**	71	25	26	17	0	2	1
Refereed Conferences on the Basis of Abstract Review**	82	5	0	56	2	13	6
Sponsor Funded Projects	128	33	15	21	17	30	12
Books & Chapters in Books**	3	0	2	1	0	0	0
Patents***	3	0	1	2	0	0	0
Doctoral Dissertations Advised	21	4	3	5	3	2	4
Master's Theses Advised	101	15	25	0	23	34	4
Graduate Research Papers Advised	10	0	5	0	5	0	0

*Some faculty are affiliated with multiple centers.

**Publications/Presentations are counted by faculty authorships.

***Includes: Patents awarded, patent applications, and invention disclosures counted by faculty authorships.

3.2 RESEARCH AND CONSULTING SPONSORSHIP

As part of an Air Force institution, the faculty members of the Air Force Institute of Technology focus their research on current problems as well as future systems of the Air Force and other DOD organizations. Evidence of this focus is that 89% of all theses, dissertations, and graduate research papers listed in Table 3.1a are externally sponsored by Air Force, DOD and government agencies. In addition, most of the research projects and consultations are carried out for Air Force and DOD units. The data are summarized in Figure 3.1 and Table 3.2.

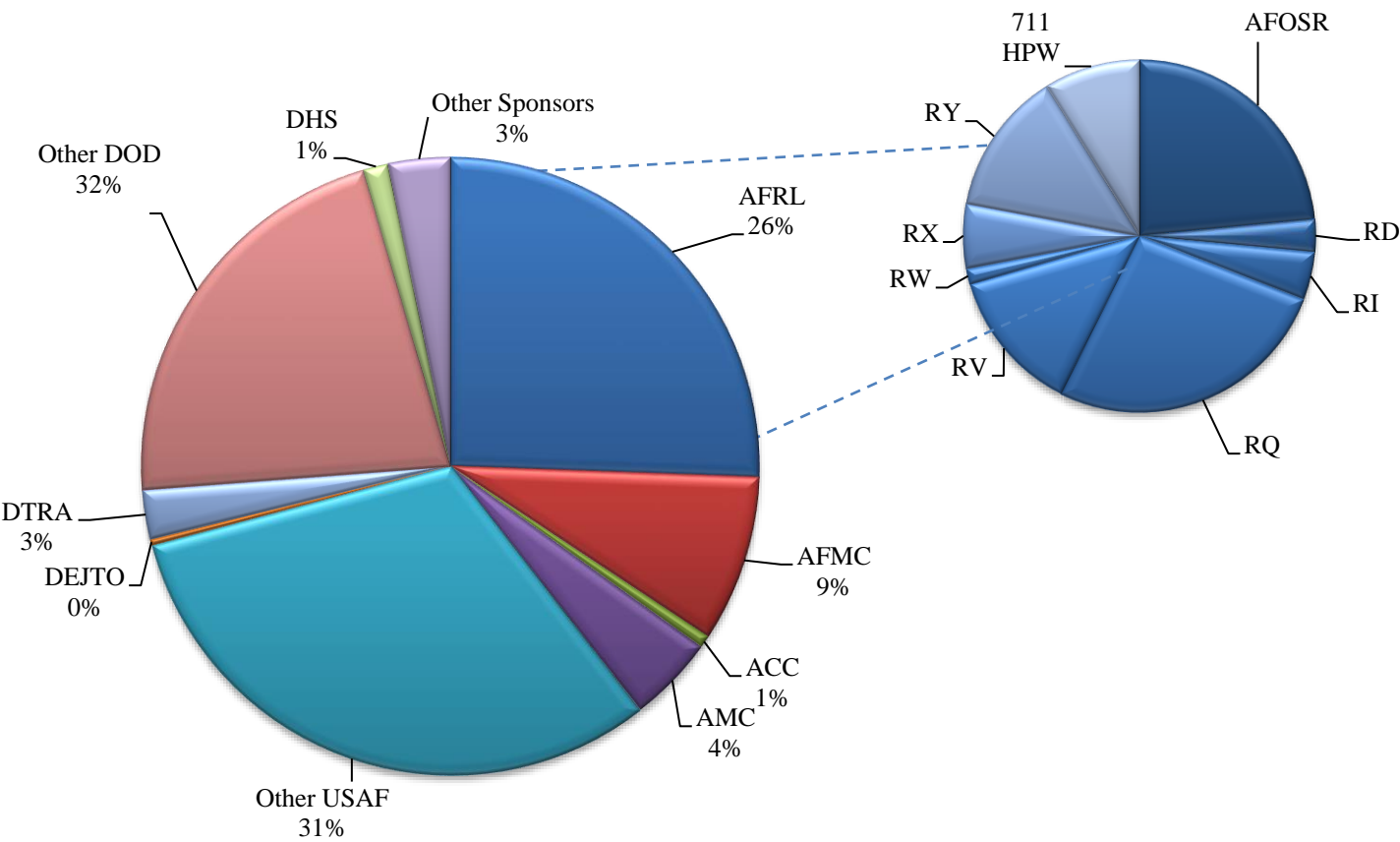


Figure 3.1 Sponsors of AFIT Theses, Dissertations, and Graduate Research Papers

Table 3.2 AFIT External Sponsorship by Organization

SPONSOR ORGANIZATION	PhD Dissertations	Master's Theses	Graduate Research Papers	Funded Projects
OFFICE OF THE SECRETARY OF THE AIR FORCE		2	1	1
HQ UNITED STATES AIR FORCE		5	1	
AIR COMBAT COMMAND		4	1	
AIR FORCE MATERIEL COMMAND	1	6		6
46 th Test Group				1
96 th Test Group		1		
704 th Test Group	1			
746 th Test Squadron		1		2
Air Force Life Cycle Management Center	1	8		9
Air Force Nuclear Weapons Center		2	1	
Air Force Research Laboratory (AFRL)	1	3		2
711 Human Performance Wing (RH)	3	9		7
Air Force Office of Scientific Research (AFOSR)	6	11		25
Aerospace Systems Directorate (RQ)	3	14		22
Directed Energy Directorate (RD)	2	1		4
Information Directorate (RI)		3		3
Materials & Manufacturing Directorate (RX)		4		8
Munitions Directorate (RW)		1		4
Sensors Directorate (RY)		9		12
Space Vehicles Directorate (RV)		9		15
Air Force Installation and Mission Support Center		3		1
Air Force Sustainment Center		2		
Air Force Test Pilot School				1
Arnold Engineering Development Center				1
AIR MOBILITY COMMAND		4	10	
AIR FORCE SPACE COMMAND		1		2
AIR FORCE SPECIAL OPERATIONS COMMAND		2	1	
USAF FIELD OPERATING AGENCIES/DIRECT REPORTING UNITS				
Air Force Civil Engineer Center		9		1
Air Force Cost Analysis Agency		1		
Air Force Inspection Agency				1
Air Force Medical Operations Agency		2		
Air Force Safety Center		1		
Air Force Technical Applications Center		1		1
National Air and Space Intelligence Center	2	2		10
OTHER DEPARTMENT OF DEFENSE		10		24
Defense Advanced Research Projects Agency				2
Defense Threat Reduction Agency	1	8		1
DOD Cyber Crime Center		1		
Directed Energy Joint Technology Office		1		6
Joint Aircraft Survivability Program Office		1		1
Joint Chief of Staff		1		
Joint Warfare Analysis Center				1
Missile Defense Agency	1			3
National Geospatial-Intelligence Agency				1
National Guard Bureau		2		

Naval Post Graduate School		1		
National Security Agency				1
Office of the Secretary of Defense	0	1		1
United States Army	1	6		6
United States Coast Guard				1
United States Navy		6	1	6
US Africa Command				3
US Special Operations Command		1		
US Transportation Command		2		1
OTHER FEDERAL AGENCIES				
Department of Energy				1
Department of Homeland Security		2		1
Domestic Nuclear Detection Office		2		
Environmental Protection Agency		5		1
National Aeronautics and Space Administration				2
NON-FEDERAL AGENCIES				
Alfred P. Sloan Foundation				1
Laboratory for Telecommunications Sciences		1		
Lockheed Martin				1
Ohio Federal Research Network				4
The Ohio State University		1		
Turkish Air Force		1		
University of Maryland Medical Center		1		
*TOTALS	23	175	16	208

3.3 EXTERNAL SPONSOR FUNDING FOR THE GRADUATE SCHOOL OF ENGINEERING AND MANAGEMENT

Many of the Graduate School of Engineering and Management's theses and research projects completed under faculty supervision are funded in part by other Air Force, DOD and government units and agencies. Often, this funding results from collaboration between faculty and thesis sponsors and occurs when the research project can be leveraged by the purchase of equipment or services not otherwise available. Figure 3.2 summarizes the past ten fiscal years of sponsored funding. Tables 3.3 and 3.4, and Figure 3.3, summarize external funding for FY18.

Figure 3.2 New Award History FY09-FY18

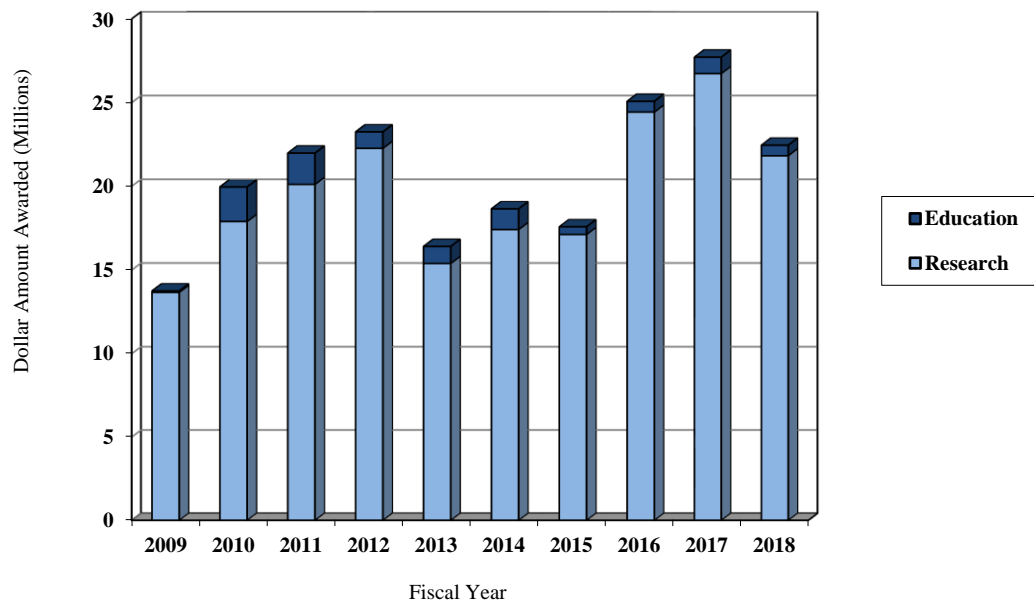


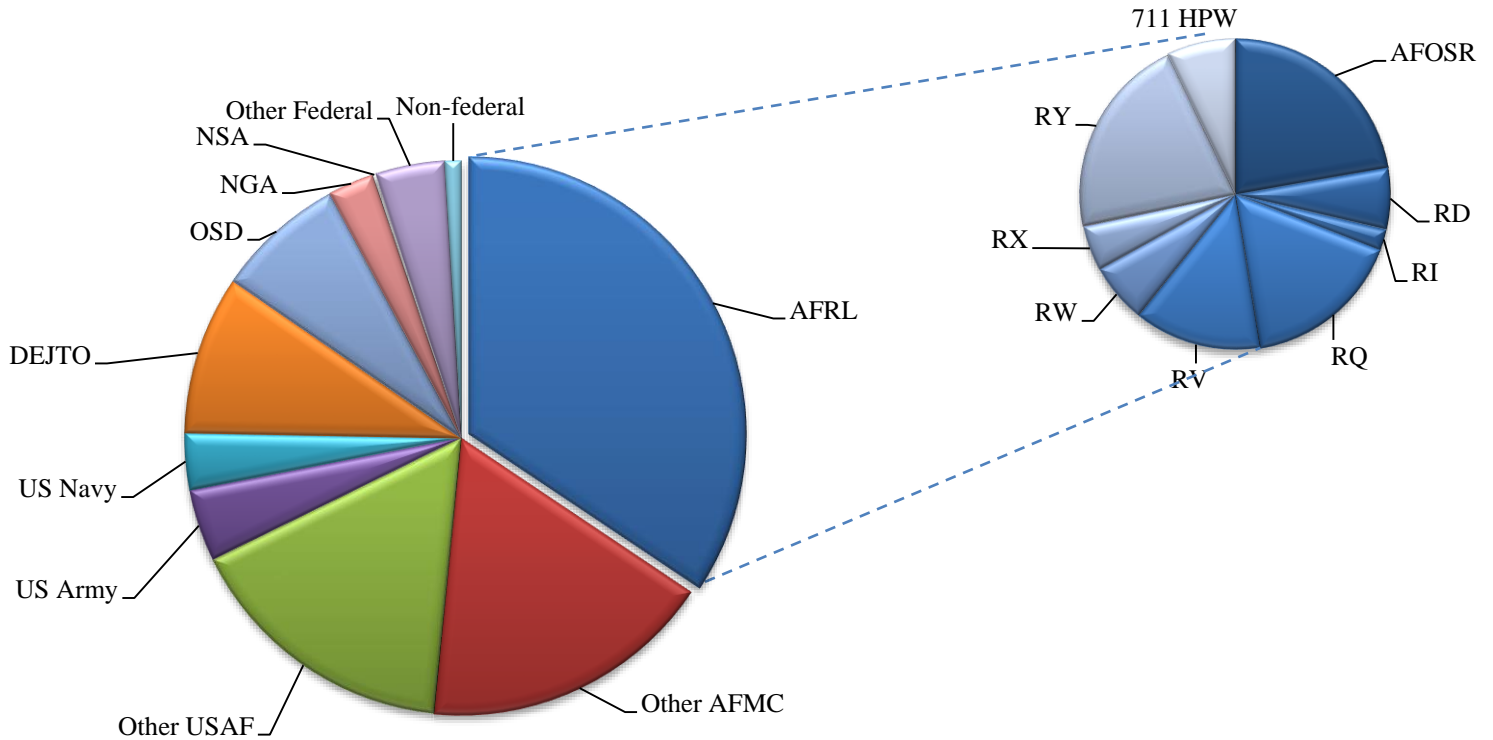
Table 3.3 FY18 External Funding & Research Expenditures for Academic Departments & Research Centers (\$1,000's)

Department	Newly Awarded Research Projects		Newly Awarded Education Projects		Total FY18 Newly Awarded Projects		Total FY18 Research Expenditures
	#	\$k	#	\$k	#	\$k	\$k
Mathematics & Statistics (ENC)	9	554	-	-	9	554	544
Electrical & Computer Eng (ENG)	55	5,774	3	150	58	5,924	5,794
Engineering Physics (ENP)	46	5,743	1	8	47	5,751	5,836
Research & Sponsored Programs (ENR)	1	88	-	-	1	88	-
Operational Sciences (ENS)	33	6,144	3	221	36	6,365	7,076
Systems Eng & Management (ENV)	13	869	1	150	14	1,019	1,074
Aeronautical & Astronautical Eng (ENY)	51	2,659	2	99	53	2,758	3,289
TOTAL	208	21,831	10	628	218	22,459	23,613

Center							
Autonomy and Navigation Technology (ANT)	31	3,871	2	120	33	3,991	4,167
Center for Cyberspace Research (CCR)	15	1,185	-	-	15	1,185	936
Center for Directed Energy (CDE)	20	2,957	1	8	21	2,965	2,799
Center for Operational Analysis (COA)	16	2,937	1	90	17	3,027	3,198
Center for Space Research and Assurance (CSRA)	29	1,902	1	20	30	1,922	2,347
Center for Tech Intel Studies & Research (CTISR)	12	1,510	-	-	12	1,510	1,633
TOTAL	123	14,362	5	238	128	14,600	15,080

Notes: Total research expenditures reported include institutional cost sharing, which is not included in newly awarded projects. Numbers reported to the ASEE and NSF research expenditure surveys vary somewhat due to differences in definitions. All Center funds are also included in departmental funding.

Figure 3.3 New FY18 Awards by Sponsor



*Pie Chart on the right shows breakdown by AFRL Technology Directorates

Table 3.4 New FY18 Awards to Academic Departments & Research Centers by Sponsor

Dept.	AFRL \$k	AFMC (Non-AFRL) \$k	Other USAF \$k	Other DOD \$k	Other Federal \$k	Non- Federal \$k	Total \$k
ENC	458	-	96	-	-	-	554
ENG	3,115	100	399	2,240	70	-	5,924
ENP	747	300	970	3,408	327	-	5,752
ENR	88	-	-	-	-	-	88
ENS	425	2,637	1,000	2,192	110	-	6,364
ENV	500	150	173	20	80	95	1,018
ENY	1,054	8	365	1,084	166	80	2,758
TOTAL	6,387	3,195	3,003	8,944	753	175	22,458

Note: "Other DOD" in this table includes the DEJTO, OSD, NGA, NSA, US Army, and US Navy pie slices from Figure 3.3, plus funding from other DOD organizations.

Center	AFRL \$k	AFMC (Non-AFRL) \$k	Other USAF \$k	Other DOD \$k	Other Federal \$k	Non- Federal \$k	Total \$k
ANT	2,237	-	180	1,544	30	-	3,991
CCR	783	-	179	153	70	-	1,185
CDE	435	300	8	2,146	77	-	2,966
COA	253	1,340	487	837	110	-	3,027
CSRA	452	-	155	1,316	-	-	1,923
CTISR	121	-	825	564	-	-	1,510
TOTAL	4,281	1,640	1,834	6,560	287	-	14,602

Note: All Center funds are also included in departmental funding

4. SPONSORSHIP OF STUDENT RESEARCH

4.1. OFFICE OF THE SECRETARY OF THE AIR FORCE

MASTER'S THESES

COTTON, TARAH E., Improving Decision Support through Storytelling. AFIT/ENV/MS/18M-190. Faculty Advisor: Dr. R. David Fass. Sponsor: SAF/FMCC.

GUION, JEFFREY J., Dynamic Cyber Mission Mapping. AFIT/ENG/MS/18M-030. Faculty Advisor: Lt Col Mark G. Reith. Sponsor: SAF/CIO. [CCR]

GRADUATE RESEARCH PAPERS

CARLSON, MICHAEL M., A Multi Criteria Decision Making Model for Air Force Enterprise Information Technology Sourcing Decisions AFIT/ENS/MS/18J-016. Faculty Advisor: Capt Benjamin T. Hazen Sponsor: SAF. [COA]

4.2. HEADQUARTERS UNITED STATES AIR FORCE

MASTER'S THESES

BET, NOLAN R., Examining Disconnects Between Air Force Manpower Funding and Manpower Execution. AFIT/ENS/MS/18M-103. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: HQ USAF/A1.

ELLIOTT, JACOB T., Air Force Officer Attrition: An Econometric Analysis. AFIT/ENS/MS/18M-118. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: HQ AF.

KANNING, MATTHEW D., An Evaluation of the Cyberspace Modeling Capabilities of the Advanced Framework for Simulation, Integration and Modeling. AFIT/ENG/MS/18M-037. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: HQ AF/A9. [CCR]

LINDELL, JACOB R., Parametric Survival Analysis of US Air Force Rated Officer Retention. AFIT/ENS/MS/18M-136. Faculty Advisor: Dr. Seong-Jong Joo. Sponsor: HQ USAF/A1.

PAK, Investigating Capability Development Management for the Air Force Strategic Development Planning & Experimentation (SDPE) Office AFIT/ENS/MS/18M-152. Faculty Advisor: LTC Christopher M. Smith. Sponsor: HQ USAF SDPE.

GRADUATE RESEARCH PAPERS

MCGUIRE, DANIEL P., Forecasting the Future of Logistics: The Formulation of an Internet of Things Capability Index AFIT/ENS/MS/18J-040. Faculty Advisor: Dr. Paul L. Hartman Sponsor: HQ USAF/A4. [COA]

4.3. AIR COMBAT COMMAND

MASTER'S THESES

BOHALL, DUSTIN D., A Study of the F-35 Sustainment Strategy: Fiscal Implications of Participant Secession. AFIT/ENS/MS/18M-108. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AF F-35A IO. [COA]

BRYAN, SAMANTHA R., Band of Brothers. AFIT/ENS/MS/18M-112. Faculty Advisor: Col Matthew A. Douglas. Sponsor: 563 RG.

MACIAS, MIGUEL J., Scheduling Tool for the Nevada Test and Training Range. AFIT/ENS/MS/18M-138. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: 57 OSS. [COA]

PRATT, JOSIAH J., Higher Order Effects of Fielding the New ICBM Gas Transfer System. AFIT/ENS/MS/18M-154. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AFGSC. [COA]

GRADUATE RESEARCH PAPERS

CHAMBERLIN, SHAWN M., Left of Launch: Deterring Tomorrow's Transformative Drone Threat AFIT/ENS/MS/18J-018. Faculty Advisor: Lt Col Jason J. Anderson. Sponsor: AFGSC.

4.4. AIR EDUCATION AND TRAINING COMMAND

AIR FORCE INSTITUTE OF TECHNOLOGY

DOCTORAL DISSERTATIONS

BROOKS, ERIC L., Compressive Sampling for Phenotype Classification. AFIT/ENC/DS/18S-001. Faculty Advisor: Dr. Christine M. Schubert Kabban. Sponsor: N/A.

CASEY, DANIEL J., Progressive Network Deployment, Performance, and Control with Software-Defined Networking. AFIT/ENG/DS/18M-017. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A. [CCR]

CURRO, JOSEPH A., Navigation with Artificial Neural Networks AFIT/ENG/DS/18S-007. Faculty Advisor: Dr. John F. Raquet. Sponsor: N/A. [ANT]

CURTIS, DAVID H., Satellite Articulation Sensing using Computer Vision AFIT/ENY/DS/18S-060. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

DILL, RICHARD, Automating Mobile Device File Format Analysis AFIT/ENG/DS/18S-008. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: N/A. [CCR]

HEFRON, RYAN G., Breaking down the barriers to operator workload estimation: Advancing algorithmic handling of temporal non-stationarity and cross-participant differences for EEG analysis using deep learning AFIT/ENG/DS/18S-012. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: N/A. [CCR]

LESSIN, AARON M., Multi-Level Multi-Objective Programming and Optimization for Integrated Air Defense System Disruption AFIT/ENS/DS/18S-035. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: N/A.

MORRILL, DANA F., Numerical Simulation of High Energy Laser Propagation. AFIT/ENC/DS/18S-003. Faculty Advisor: Dr. Benjamin F. Akers. Sponsor: N/A. [CDE]

NUNNALLY, BEAU A., Statistical Inference to Evaluate and Compare Correlated Multi-State Classification Systems. AFIT/ENC/DS/18S-004. Faculty Advisor: Dr. Christine M. Schubert Kabban. Sponsor: N/A.

OKOLICA, JAMES S., Temporal Event Abstraction and Reconstruction. AFIT/ENG/DS/17D-004. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: N/A.

PAULEC, MASON D., Reconstruction of the 3D Temperature and Species Concentration Spatial Distribution of a Jet Engine Exhaust Plume Using an Infrared Fourier Transform Spectrometer Hyperspectral Imager AFIT/ENP/DS/18S-025. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: N/A. [CDE/CTISR]

PRINCE, ERIC R., Optimal Finite Thrust Guidance Methods for Constrained Satellite Proximity Operations Inspection Maneuvers AFIT/ENY/DS/18S-071. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

MASTER'S THESES

ALLEN, TIMOTHY J., Design and Test of a UAV Swarm Architecture over a Mesh Ad-hoc Network. AFIT/ENV/MS/18M-172. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A. [ANT]

ALTOWIARQI, MAJED M., Evaluation of RSAF Airworthiness and Applicability AFIT/ENS/MS/18S-079. Faculty Advisor: Dr. William A. Cunningham. Sponsor: N/A.

BALL, NATHAN R., Effects of Dynamic Goals on Agent Performance AFIT/ENG/MS/18J-003. Faculty Advisor: Maj Jason M. Bindewald. Sponsor: N/A.

BASRAOUI, WALID, Analysis of Merit-Based Observation Scheduling for Geosynchronous Earth Orbit Space Situational Awareness. AFIT/ENV/MS/18M-175. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A. [CSRA]

BATEMAN, MARK G., Optimization of Geosynchronous Earth Orbit and Ascent Vehicle Space Situational Awareness via Parallel Evaluation of Executable Architectures. AFIT/ENV/MS/18M-176. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A. [CSRA]

BEIGHTEL, RACHAEL S., How a Conducive Environment Combined and Susceptible Followers Influence Toxic Leadership Behaviors in the Air Force: An Examination of the Toxic Triangle Theory. AFIT/ENS/MS/18M-102. Faculty Advisor: Col Matthew A. Douglas. Sponsor: N/A.

BENTLEY, WILLIAM E., Evaluating Contingency construction Methods: A Delphi Study. AFIT/ENV/MS/18M-177. Faculty Advisor: Dr. Brent T. Langhals. Sponsor: N/A.

BEYER, STEVEN M., Pattern-of-Life Modeling Using Data Leakage in Smart Homes. AFIT/ENG/MS/18M-009. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A. [CCR]

BIHANSKY, THOMAS S., Resilient Aircraft Maintenance Constructs: Enhancing Repair Network Designs to Effectively Manage Risks and Supply Chain Disruptions. AFIT/ENS/MS/18M-104. Faculty Advisor: Dr. Daniel W. Steeneck. Sponsor: N/A. [COA]

BODIN, TAYLOR B., Behavior Flexibility for Autonomous Unmanned Aerial Systems. AFIT/ENG/MS/18M-011. Faculty Advisor: Maj Jason M. Bindewald. Sponsor: N/A. [ANT]

BONEY, BIANCA E., Analysis of Cross-Cultural Training Provided to United States Air Force Civil Engineer Officers, and How Engineering Efforts are Affected on Overseas Air Force Installations: A Delphi Study. AFIT/ENV/MS/18M-231. Faculty Advisor: Dr. Diedrich V. Prigge. Sponsor: AFCLC.

BOOTHE, MELVIN K., Shop Around: An Experiment on Air Force Vehicle Parts Procurement. AFIT/ENS/MS/18M-110. Faculty Advisor: Col Matthew A. Douglas. Sponsor: N/A.

BRANTLEY, LUKE M., Looking Past the Spark to Find the Fuel of the Arab Spring Fire. AFIT/ENS/MS/18M-111. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: N/A.

BRUZA, MASON R., An Analysis of Multi-Domain Command and Control and the Development of Software Solutions through DevOps Toolsets and Practices. AFIT/ENG/MS/18M-016. Faculty Advisor: Lt Col Mark G. Reith. Sponsor: N/A. [CCR]

BUEHLER, DAVID J., Utilizing Supercomputing to Analyze Risks of An Emergent Large-Scale Debris Field in Low Earth Orbit. AFIT/ENV/MS/18M-184. Faculty Advisor: Col Dane F. Fuller. Sponsor: N/A. [CSRA]

CARRASCO, SALOME E., Efficient Phase Retrieval for Off-Axis Point Spread Functions AFIT/ENG/MS/18J-084. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: N/A.

CERRI, JOSHUA T., Thermal Testing of Fused Deposition Modeling Extended to an Orbital Environment AFIT/ENY/MS/18S-058. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: N/A. [CSRA]

CHAMBERS-MILLS, JOSHUA C., A Comparative Accreditation Alignment Analysis of Civil Engineering and Construction Management Bachelor Degrees with the Skill Requirements for USAF Civil Engineer Officers. AFIT/ENV/MS/18M-225. Faculty Advisor: Dr. Diedrich V. Prigge. Sponsor: N/A.

CIPERA, DANIEL L., Comparison of Traditional Versus CubeSat Remote Sensing: A Model-Based Systems Engineering Approach. AFIT/ENV/MS/18M-187. Faculty Advisor: Dr. David R. Jacques. Sponsor: N/A. [CSRA]

CONNORS, JACOB W., Assessing the Competing Characteristics of Privacy and Safety within Vehicular Ad Hoc Networks. AFIT/ENG/MS/18M-019. Faculty Advisor: Dr. Scott R. Graham. Sponsor: N/A. [CCR]

DAHLKE, JACOB A., Optimal Trajectory Generation in a Dynamic Multi-Body Environment using a Pseudospectral Method. AFIT/ENY/MS/18M-248. Faculty Advisor: Capt Joshuah A. Hess. Sponsor: N/A. [CSRA]

DIAZ, CARLOS D., Spatial Resolution and Contrast of a Focused Diffractive Plenoptic Camera. AFIT/ENP/MS/18M-077. Faculty Advisor: Lt Col Anthony L. Franz Sponsor: N/A.

DUANE, MARK C., Constellation Design for SSA of a Direct Ascent Servicing Mission to the Geosynchronous Belt. AFIT/ENY/MS/18M-253. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

ELLIOTT, KOLBY H., Evaluation of Resiliency in a Wide-Area Backup Protection System via Model Checking. AFIT/ENG/MS/18M-023. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: N/A. [CCR]

FAY, THOMAS J., Contextual Maneuver Estimation for Non-Cooperative Satellites in Proximity Operations AFIT/ENY/MS/18S-064. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

FELTEN, MICHAEL S., Optimization of Geosynchronous Space Situational Awareness Architectures using Parallel Computation. AFIT/ENV/MS/18M-202. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A. [CSRA]

FLENAR, KYLE A., Determining Detectable and Exploitable Aspects of Rogue Unmanned Aircraft Systems AFIT/ENV/MS/18J-059. Faculty Advisor: Dr. David R. Jacques. Sponsor: N/A.

GALLAGHER, ANTWON R., Radio Tomographic Imaging using a Modified Maximum Likelihood Estimator for Image Reconstruction in Various Environments. AFIT/ENG/MS/18M-028. Faculty Advisor: Dr. Richard K. Martin. Sponsor: N/A.

GRAFF, WILLIAM J., Evaluation of a Cloud Detection Technique Using Spatial and Radiometric Thresholds for Near Infrared Satellite Imagery. AFIT/ENP/MS/18M-083. Faculty Advisor: Lt Col Robert A. Stenger. Sponsor: N/A.

HERALD, RACHEL E., The Africa First Initiative and Local Procurement. AFIT/ENS/MS/18M-126. Faculty Advisor: Maj Timothy W. Breitbach. Sponsor: N/A.

HESTER, MICHAEL J., Supply Chain Financial Analysis in Support of Development Objectives. AFIT/ENS/MS/18M-127. Faculty Advisor: Maj Timothy W. Breitbach. Sponsor: N/A.

KALLHOFF, IVAN J., An Open Source Approach to Social Media Data Gathering. AFIT/ENS/MS/18M-130. Faculty Advisor: Dr. Bradley C. Boehmke. Sponsor: N/A.

KANIUT, MICHAEL M., Stabilized RPA Flight in Building Proximity Operations. AFIT/ENV/MS/18M-212. Faculty Advisor: Dr. David R. Jacques. Sponsor: N/A.

KATZOVITZ, JUSTIN D., Space-based Maneuver Detection and Characterization using Multiple Model Adaptive Estimation. AFIT/ENY/MS/18M-268. Faculty Advisor: Capt Joshua A. Hess. Sponsor: N/A. [CSRA]

KIM, DEBORAH B., An Analysis of the Estimate at Complete for Department of Defense Contracts. AFIT/ENC/MS/18M-214. Faculty Advisor: Dr. Edward D. White. Sponsor: N/A.

KOO, TAEHOI, Architecting a reconnaissance satellite constellation for the Korean Peninsula. AFIT/ENY/MS/18M-270. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A. [CSRA]

LANKOW, ANDREW J., A Surprising Symbiosis: Examining the Mutualism in Department of Defense Conservation Partnerships. AFIT/ENS/MS/18M-134. Faculty Advisor: Capt Benjamin T. Hazen. Sponsor: N/A. [COA]

LAW, BRADFORD E., Passive Radiolocation of IEEE 802/11 Emitters Using Directional Antennae. AFIT/ENG/MS/18M-040. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A. [CCR]

LAWRENCE, ANDREW P., Simulation and Modeling of High Energy Laser-Induced Droplet Shattering in Clouds. AFIT/ENC/MS/18M-003. Faculty Advisor: Dr. Benjamin F. Akers. Sponsor: N/A.

LEE, KIJUN, Military Application of Aerial Photogrammetry Mapping Assisted by Small Unmanned Air Vehicles. AFIT/ENV/MS/18M-219. Faculty Advisor: Dr. David R. Jacques. Sponsor: N/A. [ANT]

LESAINT, MATTHEW T., Monotonic Load and Creep Properties of Carbon Nanotube Sheets. AFIT/ENY/MS/17D-024. Faculty Advisor: Maj Ryan P. O'Hara. Sponsor: N/A.

MACKINNON, FRANCES G., A System Dynamics Innovation Diffusion Model Applied to Carbon Nanotube Manufacturing. AFIT/ENS/MS/18M-139. Faculty Advisor: Dr. Richard F. Deckro. Sponsor: N/A.

MAURO, MICHAEL D., A Tale of Two Programs: The Quest for a Replacement Helicopter for Combat Rescue. AFIT/ENS/MS/18M-141. Faculty Advisor: Dr. Seong-Jong Joo. Sponsor: N/A.

MAYER, SAMUEL A., Quality of Service Impacts of a Moving Target Defense with Software-Defined Networking. AFIT/ENG/MS/18M-045. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A. [CCR]

MAYO-JOHNSON, JEREMY A., Validation of a Midwave Infrared Nighttime Cloud Mask. AFIT/ENP/MS/18M-089. Faculty Advisor: Lt Col Robert A. Stenger. Sponsor: N/A. [CTISR]

MCCREA, JOHN P., Design of a Zero-Gravity, Vacuum-Based 3D Printer Robot for In-Space Satellite Assembly. AFIT/ENV/MS/18M-221. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: N/A. [CSRA]

MERRIMAN, CAMERON A., Modeling Ground Burst Electromagnetic Pulse for Nuclear Weapon Diagnostics. AFIT/ENP/MS/18M-090. Faculty Advisor: Lt Col James R. Fee, Jr. Sponsor: N/A.

MESSER, BRETT J., Thesis Title: DoD Resource Sharing: USAFRICOM & USEUCOM Forces AFIT/ENS/MS/18S-039. Faculty Advisor: Capt Benjamin T. Hazen. Sponsor: N/A. [COA]

MOORE, TYLER M., Special Perturbations on the Jetson TX1 and TX2 Computers. AFIT/ENG/MS/18M-047. Faculty Advisor: Col Dane F. Fuller. Sponsor: N/A. [CSRA]

MUNSON, EVAN L., Sentiment Analysis of Twitter Data. AFIT/ENS/MS/18M-148. Faculty Advisor: LTC Christopher M. Smith. Sponsor: N/A. [COA]

NACITA, ISAAC M., Modeling and Test Results of a CubeSat Shape Memory Alloy Helical Antenna Array. AFIT/ENY/MS/18M-281. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

NGUYEN, DUY K., Effects of Position Uncertainty on Passive Multistatic SAR Resolution Measures. AFIT/ENG/MS/18M-050. Faculty Advisor: Dr. Julie A. Jackson. Sponsor: N/A.

OCAMPO, RODRIGO I., CubeSat Deployable Solar Panel Hinge Using Nitinol Smart Memory Alloy. AFIT/ENY/MS/18M-282. Faculty Advisor: Maj Ryan P. O'Hara. Sponsor: N/A. [CSRA]

PHAN, TIFFANY M., RSS-based Device-free Passive Detection and Localization Using Home Automation Network Radio Frequencies. AFIT/ENG/MS/18M-054. Faculty Advisor: Dr. Richard K. Martin. Sponsor: N/A. [ANT/CCR]

RAMOS, VON DRAKE L., Vulnerability Assessment of the Smallest Agile Transmit Receive Network (SATRN) Software Suite. AFIT/ENY/MS/18M-288. Faculty Advisor: Dr. Robert F. Mills. Sponsor: N/A. [CSRA]

ROBERTS, KARSON A., Design and Testing of an Additively Manufactured CubeSat Structural Bus. AFIT/ENY/MS/18M-289. Faculty Advisor: Maj Ryan P. O'Hara. Sponsor: N/A. [CSRA]

ROCKER, CHRISTOPHER C., The Study and Application of Carbon Nanotube Film Heaters for Space Applications. AFIT/ENY/MS/18M-290. Faculty Advisor: Maj Ryan P. O'Hara. Sponsor: N/A. [CSRA]

RODRIGUEZ, FRANCISCO J., Assessing the Reliability of the B-1B Lancer Using Survival Analysis. AFIT/ENS/MS/18M-156. Faculty Advisor: Dr. Seong-Jong Joo. Sponsor: N/A.

ROEBER, JONATHAN B., Assessment of Structure from Motion for Reconnaissance Augmentation and Bandwidth Usage Reduction. AFIT/ENG/MS/18M-055. Faculty Advisor: Dr. Scott L. Nykl. Sponsor: N/A. [ANT]

ROSADO-MEDINA, LUIS D., Evaluating the Air Force Inspection System. AFIT/ENS/MS/18M-157. Faculty Advisor: Maj Timothy W. Breitbach. Sponsor: N/A.

SAMPLE, KENNETH R., Resolution Time Prediction From Air Force Network Trouble Ticket Data. AFIT/ENG/MS/18M-057. Faculty Advisor: Maj Alan C. Lin. Sponsor: N/A. [CCR]

SCHOENBECK, JOSEPH E., The Developmental Test Scheduling Problem. AFIT/ENS/MS/18M-160. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: N/A. [COA]

SMITH, JEFFREY R., The Application of Text Mining and Data Visualization Techniques to Textual Corpus Exploration. AFIT/ENS/MS/18M-163. Faculty Advisor: LTC Christopher TOMPKINS, JOSEPH C., Near Earth Space Object Detection Utilizing Parallax as Multi-Hypothesis Test Criterion. AFIT/ENG/MS/18M-064. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: N/A.

SPAN, MARTIN T., Conceptual Systems Security Analysis Aerial Refueling Case Study. AFIT/ENV/MS/18M-237. Faculty Advisor: Lt Col Logan O. Mailloux. Sponsor: N/A.

SPENDEL, DAVID F., Parameter Study of an Orbital Debris Defender Using Two Team, Three Player Differential Game Theory. AFIT/ENY/MS/18M-295. Faculty Advisor: Capt Joshua A. Hess. Sponsor: N/A. [CSRA]

TOMLIN, DESTINY B., Creation and Presentation of a Systems-Level Model for an AF-M315E Monopropellant Micro-Thruster AFIT/ENY/MS/18S-075. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: N/A. [CSRA]

WAGGONER, KULLEN W., Segmented Control of Electrostatically Actuated Bimorph Micromirrors. AFIT/ENG/MS/18M-065. Faculty Advisor: Capt Robert A. Lake. Sponsor: N/A.

WERNER, CALEB J., Military Utility Analysis of RF Geolocation via Quadrifilar Antennas Onboard a CubeSat. AFIT/ENY/MS/18M-302. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

WILKINSON, KYLE S., Analysis of a Voting Method for Ranking Network Centrality Measures on a Node-aligned Multiplex Network. AFIT/ENS/MS/18M-170. Faculty Advisor: Dr. Richard F. Deckro. Sponsor: N/A.

WISE, LEE F., Modeling of Store Separation Effects on a Specific Self-Defense Missile. AFIT/ENY/MS/18M-306. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: N/A.

WOLFE, CLARK L., Securing Data in Transit Using Two Channel Communication. AFIT/ENG/MS/18M-069. Faculty Advisor: Dr. Scott R. Graham. Sponsor: N/A. [CCR]

TROYA, AUSTIN A., A Study of the Air Force Airworthiness Assessment Process with Recommendations for Reusable Launch Vehicles. AFIT/ENV/MS/18M-241. Faculty Advisor: Lt Col Logan O. Mailloux. Sponsor: N/A.

YOON, YONGJUN, Mitigating Interference with Knowledge-Aided Subarray Pattern Synthesis and Space Time Adaptive Processing AFIT/ENG/MS/18J-009. Faculty Advisor: Lt Col Phillip M. Corbell. Sponsor: N/A.

GRADUATE RESEARCH PAPERS

BEAUDOIN, DAVID J., Needs Assessment for IRBMS in US Nuclear Deterrence AFIT/ENS/MS/18J-012. Faculty Advisor: LTC Christopher M. Smith. Sponsor: N/A.

CANNONE, ANTHONY J., Executive Airlift Fleet Size After C-20 Retirement AFIT/ENS/MS/18J-015. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: N/A. [COA]

CARMEAN, DOUGLAS W., Linking Airmen to the Mission through Operations: Helping the Air Force Rediscover its Identity AFIT/ENS/MS/18J-017. Faculty Advisor: Dr. Melvin G. Deaile. Sponsor: N/A.

GOETZ, CHARLES W., Threshold-Graphing: A Model for Predicting Escalation Events AFIT/ENS/MS/18J-024. Faculty Advisor: Lt Col Jason J. Anderson. Sponsor: N/A.

GUTIERREZ, JAMES L., Analysis of the Minuteman III to Ground Based Strategic Deterrent Transition AFIT/ENS/MS/18J-026. Faculty Advisor: Dr. William A. Cunningham. Sponsor: N/A.

HANNIGAN, JOSEPH A., Signaling Theory and Deterrence: Filling the Escalation Dominance Gap AFIT/ENS/MS/18J-027. Faculty Advisor: Dr. Melvin G. Deaile. Sponsor: N/A.

MODAD, ROBBY J., ICBM Technologies to Counter Adversary Nuclear Threats AFIT/ENS/MS/18J-043. Faculty Advisor: Capt Benjamin T. Hazen Sponsor: N/A. [COA]

SUNDMAN, JONATHAN E., Evaluating the Efficacy of Emerging Technologies to Increase the Lethality of Nuclear Transportation Security Forces AFIT/ENS/MS/18J-053. Faculty Advisor: Capt James E. Bevins. Sponsor: N/A.

WHITE, GREGORY C., If South Korea Wanted Nuclear Weapons: A Social Exchange Theory View AFIT/ENS/MS/18J-055. Faculty Advisor: Dr. Melvin G. Deaile. Sponsor: N/A.

4.5. AIR FORCE MATERIEL COMMAND

DOCTORAL DISSERTATIONS

RANLY, NEIL C., Methods to Support the Project Selection Problem with Non-Linear Portfolio Objectives, Time Sensitive Objectives, Time Sensitive Resource Constraints, and Modeling Inadequacies AFIT/ENS/DS/18S-040. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AFMC. [COA]

MASTER'S THESES

BOBIC, BENJAMIN D., Flight line Heroics and the Façade of a Healthy Common Support Equipment Fleet. AFIT/ENS/MS/18M-106. Faculty Advisor: Dr. Daniel W. Steeneck. Sponsor: AFMC.

FINNEY, DANIEL S., Aircraft Availability: Maintenance Inputs and Acquisition Decisions. AFIT/ENS/MS/18M-120. Faculty Advisor: Dr. Paul L. Hartman Sponsor: AFMC. [COA]

NOBLE, CLIFTON M., Simulating Aircraft Availability in a Combat Environment Considering Logistics. AFIT/ENS/MS/18M-150. Faculty Advisor: Dr. John O. Miller Sponsor: AFMC. [COA]

MIMS, RAYMOND L., Predicting Agency Contributions for the Federal Employment Retirement System (FERS) Fund. AFIT/ENV/MS/18M-226. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: AFMC.

WEBER, MICHAEL J., Managing Supply Discrepancies: The Effect of Performance Measurement and Feedback on Order Fulfillment Quality. AFIT/ENS/MS/18M-168. Faculty Advisor: Dr. Daniel W. Steeneck. Sponsor: AFMC.

YORK, NICOLE B., Comparing Organizational Structures via Alternative Cooperative Game Theoretic Frameworks. AFIT/ENS/MS/17D-012. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: AFMC.

96TH TEST GROUP

MASTER'S THESES

HOPE, DYLAN N., An Efficient Euler Method to Predict Shock Migration on an Oscillating Straked Delta Wing Design. AFIT/ENY/MS/18M-264. Faculty Advisor: Dr. Donald L. Kunz Sponsor: 96th TG.

704TH TEST GROUP

DOCTORAL DISSERTATIONS

ZAKRAJSEK, ANDREW J., The Investigation of Aircraft Tire Spin-Up Wear as a Function of Various Landing Parameters Through Experimentation, Computational Modeling, and Probabilistic Predictions. AFIT/ENY/DS/18M-309. Faculty Advisor: Dr. Donald L. Kunz Sponsor: 704 TG.

746TH TEST SQUADRON

MASTER'S THESES

GOODBODY, IAN R., Applying Direct GPS Spectrum Sensing Anti-jamming Receiver Solutions. AFIT/ENG/MS/18M-029. Faculty Advisor: Dr. Sanjeev Gunawardena. Sponsor: 746 TS. [ANT/CCR]

AIR FORCE LIFE CYCLE MANAGEMENT CENTER

DOCTORAL DISSERTATIONS

LITTLE, ZACHARY C., Experimental Designs, Meta-modeling, and Meta-learning for Mixed-Factor Systems with Large Decision Spaces. AFIT/ENS/DS/18M-137. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AFLCMC. [COA]

MASTER'S THESES

CASEY, JOSHUA P., C-130J Inventory Control Point Location Determination. AFIT/ENS/MS/18M-114. Faculty Advisor: Dr. William A. Cunningham. Sponsor: AFLCMC.

DAVIS, MATTHEW W., Cybersecurity Assessment and Mitigation Stochastic Model. AFIT/ENV/MS/18M-194. Faculty Advisor: Lt Col Logan O. Mailloux. Sponsor: AFLCMC.

ELLIS, JAMES C., The Impact of Changing Requirements. AFIT/ENC/MS/18M-200. Faculty Advisor: Dr. Edward D. White. Sponsor: AFLCMC.

FURRER, SARAH K., Simulating B-2 Heavy Maintenance Policies Driven by Low Observable Maintenance Management to Determine Future Fleet Health. AFIT/ENS/MS/18M-122. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AFLCMC. [COA]

HEWITSON, SCOTT C., An Analysis of Stability Properties in Operating and Support Costs for Air Force Aircraft. AFIT/ENV/MS/18M-207. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: AFLCMC.

MCGOWIN, AMANDA L., An Analysis of Major Acquisition Reforms Through Text Mining and Grounded Theory Design. AFIT/ENV/MS/18M-224. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: AFLCMC.

O'HANLON, GARRETT B., An Analysis of Aircraft Operating and Support Cost Element Structures and Their Contribution to Total Costs. AFIT/ENV/MS/18M-227. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: AFLCMC.

YOUNG, SHAUNA M., Analysis of Influences of Separation Decisions in the Financial Management Career Field. AFIT/ENV/MS/18M-243. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: AFLCMC.

AIR FORCE NUCLEAR WEAPON CENTER

MASTER'S THESES

BEARDSLEY, JOSHUA-EDWARD C., Evaluation of Computational Fluid Dynamics for Potential Use in Thermal Flash Characterization. AFIT/ENY/MS/18M-259. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: AFNWC.

SAUER, STEVEN G., Effects of Artificial Aging on Paint Thermal Flash Characteristics. AFIT/ENP/MS/18M-096. Faculty Advisor: Dr. James C. Petrosky. Sponsor: AFNWC.

GRADUATE RESEARCH PAPERS

MARTIN, ANDRIA K., Effects Caused by Radioactive Isotope Release from Damaged Spent Nuclear Fuel Assemblies AFIT/ENS/MS/18J-037. Faculty Advisor: Dr. John W. McClory. Sponsor: AFNWC.

AIR FORCE RESEARCH LABORATORY

DOCTORAL DISSERTATIONS

KNISELY, ALEXANDER G., Non-Destructive Characterization of Rotated Uniaxial Anisotropic Materials
AFIT/ENG/DS/18S-013. Faculty Advisor: Dr. Michael J. Havrilla. Sponsor: AFRL.

MASTER'S THESES

DUNN, MICHAEL H., Assessing and Expanding Extracurricular Cybersecurity Youth Activities' Impact on Career
Interest. AFIT/ENG/MS/18M-021. Faculty Advisor: Dr. Laurence D. Merkle. Sponsor: AFRL. [CCR]

HUFF, RILEY, Design, Buildup, and Testing of a Radial Rotating Detonation Engine for a Compact Auxiliary Power
Unit. AFIT/ENY/MS/18M-266. Faculty Advisor: Dr. Marcus D. Polanka. Sponsor: AFRL.

PRICE, BRYAN J., Additive Manufacturing: Predicting Costs for DoD Systems. AFIT/ENV/MS/18M-229. Faculty
Advisor: Dr. Robert D. Fass. Sponsor: AFRL.

AFRL: 711th HUMAN PERFORMANCE WING

DOCTORAL DISSERTATIONS

CEZEAUX, JASON R., Characterizations of Particles Formed During Non-Critical Nuclear Weapons Accidents
AFIT/ENP/DS/18S-021. Faculty Advisor: Dr. James C. Petrosky. Sponsor: 711 HPW/RH.

WEBBER, FREDERICK C., Multi-Objective Reinforcement Learning with Concept Drift. AFIT/ENG/DS/17D-006.
Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: 711 HPW/RH. [ANT]

WEIMER, CHRISTOPHER W., Generating Strong Diversity of Opinions: Agent Models of Continuous Opinion
Dynamics AFIT/ENS/DS/18S-044. Faculty Advisor: Dr. John O. Miller. Sponsor: 711 HPW/RH. [COA]

MASTER'S THESES

BERRY, JOE R., Characterization of ATD and Human Responses Under -Gz Accelerative Input.
AFIT/ENV/MS/18M-178. Faculty Advisor: Lt Col Jeffrey C. Parr. Sponsor: 711 HPW/RH.

BORNEMAN, MARKUS M., Estimating Defensive Cyber Operator Decision Confidence. AFIT/ENG/MS/18M-013.
Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: 711 HPW/RH. [CCR]

BOLTON, SARAH J., Cognitive Effects of Short Duration Short Wavelength Visible Light. AFIT/ENG/MS/18M-
012. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: 711 HPW/USAFSAM.

BRYANT, TODD A., Characterization of Heavy Charged Particle Exposure on the Radiation Resistant Bacterium,
Deinococcus Radiodurans. AFIT/ENP/MS/18M-071. Faculty Advisor: LTC Douglas R. Lewis. Sponsor: 711
HPW/USAFSAM.

DAUGHTRY, RICHARD F., Characterization of Silicon Ion Exposure on Deinococcus Radiodurans.
AFIT/ENP/MS/18M-075. Faculty Advisor: LTC Douglas R. Lewis. Sponsor: 711 HPW/USAFSAM.

DUNCAN, BRADLEY M., Air Force Corporate Exposure Assessment Strategy: Underlying Cost Behaviors &
Visibility. AFIT/ENV/MS/18M-196. Faculty Advisor: Lt Col Robert M. Eninger. Sponsor: 711 HPW/USAFSAM.

FRITTS, MICHAEL S., Human Optimization and Performance Enhancement in Flight via Real-time Biofeedback
(Project HAVE HOPE). AFIT/ENY/MS/18M-258. Faculty Advisor: Lt Col Chad Hale. Sponsor: 711 HPW/RH.

RAMIREZ, RACHEL C., Characterization of Ambient Noise. AFIT/ENS/MS/18M-155. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: 711 HPW/RH.

TRAWICK, JESSE A., Occupational Noise Dose Reduction Via Behavior Modification Using In-Ear Dosimetry Among USAF Personnel Exposed to Continuous and Impulse Noise. AFIT/ENV/MS/18M-240. Faculty Advisor: Dr. Jeremy M. Slagley. Sponsor: 711 HPW/USAFSAM.

AFRL: AIR FORCE OFFICE OF SCIENTIFIC RESEARCH

DOCTORAL DISSERTATIONS

ADOMANIS, BRYAN M., Design and Optimization of Plasmonic 3-D Huygens Metasurface Building Blocks for Highly-Efficient Flat Optics AFIT/ENP/DS/18S-018. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: AFOSR. [CDE]

BECKER, DAVID J., Techniques for Improved Space Object Detection Performance from Ground-Based Telescope Systems Using Long and Short Exposure Images AFIT/ENG/DS/18S-006. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: AFOSR.

DELEON, ARMANDO, Investigation of Several Methods of Evaluating Wear in a High-Speed Environment. AFIT/ENY/DS/18M-249. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFOSR.

ENGLE, RYAN D., A Methodology for Evaluating Relational and NoSQL Databases for Small-Scale Storage and Retrieval AFIT/ENV/DS/18S-047. Faculty Advisor: Dr. Brent T. Langhals. Sponsor: AFOSR.

SCHWAAB, MATTHEW J., Arrhenius Rate Chemistry Informed Inter-phase Source Terms (ARCIIST) for Macro-Scale Explosive Hydrocodes AFIT/ENY/DS/18S-072. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: AFOSR. [CTISR]

SHEPHERD, JACK A., Evaluation and Quantification of Diffractive Plenoptic Camera Algorithm Performance AFIT/ENP/DS/18S-026. Faculty Advisor: Lt Col Anthony L. Franz Sponsor: AFOSR. [CTISR]

MASTER'S THESES

ANDERSON, ROGER S., Defender-Assisted Evasion and Pursuit Maneuvers. AFIT/ENG/MS/18M-007. Faculty Advisor: Dr. Meir Pachter. Sponsor: AFOSR. [ANT]

CASTELLO, ANTHONY A., A Study of the Hexakis Icosahedron Vacuum Lighter Than Air Vehicle and the Effects of Air Evacuation on the Structural Integrity. AFIT/ENY/MS/18M-246. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFOSR.

DEMARCO, KEVIN J., Control, Characterization, and Cooling of an Ultra-Compact Combustor. AFIT/ENY/MS/18M-250. Faculty Advisor: Dr. Marcus D. Polanka. Sponsor: AFOSR.

KERST, AMY M., Investigation of Scramjet Flowfield Temperatures at the Boundary Layer with Hyperspectral Imaging AFIT/ENP/MS/18J-011. Faculty Advisor: Dr. Kevin C. Gross. Sponsor: AFOSR. [CTISR]

LEE, LAWRENCE J., Bandwidth Analysis of a Tightly-Packed Crossed-Dipole Array for Satellite Communications. AFIT/ENG/MS/18M-041. Faculty Advisor: Dr. Andrew J. Terzuoli. Sponsor: AFOSR. [CSRA]

MOORE, KYLE D., Quasi-Static Nonlinear Analysis of a Celestial Icosahedron Shaped Vacuum Lighter Than Air Vehicle. AFIT/ENY/MS/18M-280. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFOSR.

PRY, GLEN E., Creep of Hafnium Diboride -20 Vol% Silicon Carbide at 1500°C in Air. AFIT/ENY/MS/18M-286. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFOSR.

SHEETS, BRAEDEN A., Pseudo Linear Hall Effect Thruster Characterization Through Potential, Magnetic, and Optical Measurements. AFIT/ENY/MS/18M-293. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFOSR. [CSRA]

SHUFF, CHARLES L., Effects of Surface Imperfection Depth on a Hypersonic Reentry Vehicle. AFIT/ENY/MS/18M-294. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: AFOSR.

WOOD, MATTHEW L., Leading Edge Oscillatory Blowing: Influence on Subsonic Cavity Flow and Application in Synchronized Dynamic Store Release AFIT/ENY/MS/18J-083. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: AFOSR.

WRIGHT, SAMUEL D., Characterization and Analysis of Plasma Instabilities in a 600W Permanent Magnet Hall Thruster. AFIT/ENY/MS/18M-308. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFOSR. [CSRA]

AFRL: AEROSPACE SYSTEMS DIRECTORATE

DOCTORAL DISSERTATIONS

BOHAN, BRIAN T., Combustion Dynamics and Heat Transfer in an Ultra Compact Combustor AFIT/ENY/DS/18S-057. Faculty Advisor: Dr. Marcus D. Polanka. Sponsor: AFRL/RQ.

OLSEN, CHRISTOPHER C., A Heuristic Method for Task Selection in Persistent ISR Missions Using Autonomous Unmanned Aerial Vehicles AFIT/ENY/DS/18S-067. Faculty Advisor: Dr. Donald L. Kunz Sponsor: AFRL/RQ.

ZOLLARS, MICHAEL D., Simplex Control Methods for Robust Convergence of Small Unmanned Aircraft Flight Trajectories in the Constrained Urban Environment AFIT/ENY/DS/18S-078. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RQ. [ANT]

MASTER'S THESES

BEASLEY, BRIAN A., Investigation of a Pressure Wave Supercharger for an Industrial Diesel Engine AFIT/ENY/MS/18S-055. Faculty Advisor: Dr. Marcus D. Polanka. Sponsor: AFRL/RQ.

CHANG, DAYLE L., Computational Investigation Using Bleed as a Method of Shock Stabilization. AFIT/ENY/MS/18M-247. Faculty Advisor: Maj Darrell S. Crowe. Sponsor: AFRL/RQ.

DESROCHES, JEFFREY A., Suppression of Vortex-Induced Vibrations for Elliptical Cylinders Using Mixed Convection. AFIT/ENY/MS/18M-251. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFRL/RQ.

FISCHER, JACOB P., Influence of Coolant Flow Rate Parameters in Scaling Gas Turbine Cooling Effectiveness on a Flat Plate. AFIT/ENY/MS/18M-256. Faculty Advisor: Maj James L. Rutledge Sponsor: AFRL/RQ.

HIGGINS, NICHOLAS S., Flying Qualities Evaluation of Unmanned Aircraft Using JSBSim AFIT/ENY/MS/18J-074. Faculty Advisor: Dr. Donald L. Kunz Sponsor: AFRL/RQ.

HOFFMAN, JEREMIAH R., Passive Load Testing for Evaluation of Electromechanical Actuators. AFIT/ENY/MS/18M-263. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFRL/RQ. [CSRA]

MARCO, NICHOLAS J., Wall-Modeled Large Eddy Simulation of a Three-Dimensional Shock-Boundary Layer Interaction. AFIT/ENY/MS/18M-277. Faculty Advisor: Maj Jeffrey R. Komives. Sponsor: AFRL/RQ.

OREN, EVAN P., Three-Dimensional Wall Effects of a Scramjet Cavity Flameholder AFIT/ENY/MS/18S-068. Faculty Advisor: Maj Jeffrey R. Komives. Sponsor: AFRL/RQ. [CTISR]

PAULSON, ZACHARY C., Mitigating the Effects of Boom Occlusion on Automated Aerial Refueling Through Shadow Volumes. AFIT/ENG/MS/18M-051. Faculty Advisor: Dr. Scott L. Nykl. Sponsor: AFRL/RQ. [ANT]

SEYDEL, NICHOLAS J., Stereo Vision: A Comparison of Synthetic Imagery vs Real World Imagery for the Automated Aerial Refueling Problem. AFIT/ENG/MS/18M-059. Faculty Advisor: Dr. Scott L. Nykl. Sponsor: AFRL/RQ. [ANT]

STUART, THOMAS R., Integrity Monitoring for Automated Aerial Refueling: A Stereo Vision Approach. AFIT/ENG/MS/18M-062. Faculty Advisor: Dr. Scott L. Nykl. Sponsor: AFRL/RQ. [ANT]

WATERS, MICHAEL C., Analysis of Additively Manufactured Injectors for Rotating Detonation Engines. AFIT/ENY/MS/18M-301. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFRL/RQ. [CSRA]

WHITMAN, JOSEPH R., Application of Spectral Solution and Neural Network Techniques in Plasma Modeling for Electric Propulsion AFIT/ENY/MS/18S-076. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFRL/RQ. [CSRA]

WILCOX, STEFFAN M., Tensile Properties and Fatigue Behavior of Geopolymer Matrix Composites with Carbon Fiber Reinforcement at Elevated Temperature. AFIT/ENY/MS/18M-304. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RQ.

AFRL: DIRECTED ENERGY DIRECTORATE

DOCTORAL DISSERTATIONS

ROSADO GARCIA, CARLOS X., Effects of Temporal Coherence on Target Based Phasing of Fiber Laser Arrays. AFIT/ENG/DS/18M-056. Faculty Advisor: Maj Milo W. Hyde. Sponsor: AFRL/RD.

VAN ZANDT, NOAH R., The Benefits of Polychromatic Speckle Mitigation for Shake Hartmann Wavefront Sensors. AFIT/ENP/DS/17D-009. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: AFRL/RD. [CDE]

MASTER'S THESES

GREEN, PRESTON A., Where the HEL?: Optimal Asset Location for High Energy Laser Defense of High Value Assets. AFIT/ENS/MS/18M-124. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: AFRL/RD.

AFRL: INFORMATION DIRECTORATE

MASTER'S THESES

BROYLES, DANIEL J., Non-GNSS Smartphone Pedestrian Navigation Using Barometric Elevation and Digital Map-Matching. AFIT/ENG/MS/18M-015. Faculty Advisor: Dr. John F. Raquet Sponsor: AFRL/RI. [ANT]

FROBERG, BRANDON P., Assured Android Execution Environments. AFIT/ENG/MS/18M-027. Faculty Advisor: Dr. Laurence D. Merkle. Sponsor: AFRL/RI. [CCR]

SHELTERS, BERTUS A., Satellite Communications in the V and W Band: Tropospheric Effects. AFIT/ENG/MS/18M-060. Faculty Advisor: Dr. Andrew J. Terzuoli. Sponsor: AFRL/RI. [CSRA]

AFRL: MATERIALS AND MANUFACTURING DIRECTORATE

MASTER'S THESES

GUMUCIO, LOGAN M., Creep of Hi-Nicalon S Ceramic Fiber Tows at 1100°C In Air and In Silicic Acid-Saturated Steam AFIT/ENY/MS/18J-072. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

KROEGER, BRIAN G., Creep of Hi-NicalonT S Ceramic Fiber Tows at 1000°C In Air and In Silicic Acid-Saturated Steam. AFIT/ENY/MS/18M-271. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

MINOR, SAVANNAH N., Creep of N720/A Ceramic Matrix Composite with Laser Drilled Effusion Holes at 1200°C in Air and in Steam. AFIT/ENY/MS/18M-279. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

MORRIS, LEE R., Study of Abnormal Grain Growth in Beta Annealed TI-6AL-4V Forgings. AFIT/ENY/MS/18M-310. Faculty Advisor: Maj Ryan P. O'Hara. Sponsor: AFRL/RX.

AFRL: MUNITIONS DIRECTORATE

MASTER'S THESES

PATEL, AADIT A., Multi-Material Topology Optimized Perforator. AFIT/ENY/MS/18M-285. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFRL/RW.

AFRL: SENSORS DIRECTORATE

MASTER'S THESES

BENTJEN, KARL C., Mitigating the Effects of Cyber Attacks and Human Control in an Autonomous Intersection. AFIT/ENG/MS/18M-008. Faculty Advisor: Dr. Scott R. Graham. Sponsor: AFRL/RX. [CCR]

BREAU, TREVOR A., Radar Analog Versus Digital LFM Waveform Discrimination Using The Data Collection Pod Receiver. AFIT/ENG/MS/17D-028. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/RX.

CELEBUCKI, DANIEL J., Methods of Reverse Engineering a Bitstream for Field Programmable Gate Array Protection. AFIT/ENG/MS/18M-018. Faculty Advisor: Dr. Scott R. Graham. Sponsor: AFRL/RX. [CCR]

ELLIS, JOSEPH A., Low-Profile Vertically Polarized End-Fire Radiating Antennas for V-Band Applications. AFIT/ENG/MS/18M-024. Faculty Advisor: Dr. Peter J. Collins. Sponsor: AFRL/RX.

ERVIN, RODERICK D., Detecting YARD Stick One Rogue Attacks on Insteon Home Automation Devices Using a Low Cost Software Defined Radio (SDR). AFIT/ENG/MS/18M-025. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/RX. [CCR]

KOCH, DANIEL K., Dual Source Excitation Rectangular Waveguide Design and Evaluation for the Measurement of Electromagnetic Material Properties. AFIT/ENG/MS/18M-039. Faculty Advisor: Dr. Michael J. Havrilla. Sponsor: AFRL/RX.

PETERS, CHRISTIAN K., Discriminating Terrestrial Trunked Radio (TETRA) System Devices Using Distinct Native Attribute Fingerprinting. AFIT/ENG/MS/18M-053. Faculty Advisor: Maj Joan A. Betances Jorge. Sponsor: AFRL/RX. [CCR]

SWIHART, EVAN V., Expected Coverage (ExCov): A Proposal to Compute Fuzz Test Coverage within an Infinite Input Space. AFIT/ENG/MS/18M-063. Faculty Advisor: Maj Timothy J. Carbino. Sponsor: AFRL/RX. [CCR]

WILLIS, JOHN M., MIL-STD-1553 Fingerprinting Using Existing Card Functionality. AFIT/ENG/MS/18M-068. Faculty Advisor: Dr. Robert F. Mills. Sponsor: AFRL/RX. [CCR]

AFRL: SPACE VEHICLES DIRECTORATE

MASTER'S THESES

HART, DANIEL D., Techniques for Low-Latency in Software-Defined Radio-Based Networks. AFIT/ENG/MS/18M-032. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RV. [CCR]

HUDSON, KEITH A., Application of Automated Balancing Methods for an Attitude Control Test Platform with Non-Orthogonal Masses AFIT/ENY/MS/18J-076. Faculty Advisor: Capt Andrew J. Lingenfelter. Sponsor: AFRL/RV. [CSRA]

KANG, MIN W., An Exploration of Error-Correcting Codes for use in Noise-Prone Satellite Environments. AFIT/ENG/MS/18M-036. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RV.

KENNEDY, PATRICK R., Plasmonic Grating Geometries and Wavelength-Dependent Focus Depth in Infrared Detectors. AFIT/ENG/MS/18M-038. Faculty Advisor: Maj Tod Laurvick. Sponsor: AFRL/RV.

KNIPLING, KALEN L., A Comparison of High Frequency Angle of Arrival and Ionosonde Data During a Traveling Ionospheric Disturbance. AFIT/ENP/MS/18M-087. Faculty Advisor: Maj Daniel J. Emmons. Sponsor: AFRL/RV.

LARUE, ROBERT B., Algorithms for Small Satellite Formation Flying. AFIT/ENY/MS/18M-273. Faculty Advisor: Lt Col Kirk W. Johnson. Sponsor: AFRL/RV. [CSRA]

LIU, KAN B., Design and Evaluation of an Additively Manufactured Lattice Optimized Actively Cooled Nose Cone. AFIT/ENY/MS/18M-275. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFRL/RV. [CSRA]

LOIBL, ROBERT P., Target Detection using Convolutional Neural Networks. AFIT/ENG/MS/18M-043. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RV. [CTISR]

PENTECOST, SEELEY M., Demonstration of Signal Authentication and Dynamic Configuration Concepts for Next-Generation GPS Satellites. AFIT/ENG/MS/18M-052. Faculty Advisor: Dr. Sanjeev Gunawardena. Sponsor: AFRL/RV. [ANT]

AIR FORCE INSTALLATION AND MISSION SUPPORT CENTER

MASTER'S THESES

HOLLIGER, THEODORE S., Strategic Sourcing Via Category Management: Helping Air Force Installation Contracting Agency Eat One Piece of the Elephant. AFIT/ENS/MS/18M-128. Faculty Advisor: Dr. Bradley C. Boehmke. Sponsor: AFICA. [COA]

OKAMOTO, JAMES T., Air Force Installation Contracting Agency Category Management through Expenditure Profiling. AFIT/ENV/MS/18M-228. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: AFICA.

SEVIER, WILLIAM C., Text Classification of Installation Support Contract Topic Models for Category Management. AFIT/ENS/MS/18M-161. Faculty Advisor: Dr. Bradley C. Boehmke. Sponsor: AFICA. [COA]

AIR FORCE SUSTAINMENT CENTER

MASTER'S THESES

MCCLURE, GORDON M., Schedule Optimization and Simulation for the F-16 Service Life Extension Program AFIT/ENS/MS/18S-036. Faculty Advisor: Dr. John O. Miller. Sponsor: AFSC. [COA]

MCLANE, MICHAEL P., Cultivating Agile Organizational Culture: Addressing Resistance to Change In Bureaucratic Government Organizations. AFIT/ENS/MS/18M-145. Faculty Advisor: Col Matthew A. Douglas. Sponsor: AFSC

4.6. AIR MOBILITY COMMAND

MASTER'S THESES

BOONE, STEPHANIE M., Shortest Path across Stochastic Network with Correlated Random Arcs. AFIT/ENC/MS/18M-109. Faculty Advisor: Lt Col Andrew J. Geyer. Sponsor: AMC.

LEUNG, BENJAMIN W., CRAF and Organic Air Movements Costing by Route Selection. AFIT/ENS/MS/18M-135. Faculty Advisor: Col Adam D. Reiman. Sponsor: AMC.

OWENS, CASEY L., Not All Tons are Created Equal: Analyzing Aerial Port Capability to Define the Working Ton. AFIT/ENS/MS/18M-151. Faculty Advisor: Lt Col Jason J. Anderson. Sponsor: AMC.

WILLIAMS, PETER J., Aerial Port of the Future: Developing Paperless Operations. AFIT/ENS/MS/18M-171. Faculty Advisor: Col Matthew A. Douglas. Sponsor: AMC.

GRADUATE RESEARCH PAPERS

CRISS, ALEXANDER G., Circadian Rhythm Disruption: A Comparative Analysis of Enumeration for the Mobility Air Force AFIT/ENS/MS/18J-019. Faculty Advisor: Lt Col Jason J. Anderson. Sponsor: AMC.

GLOVER, ADAM J., The Aviation Technical Track: A Cure to the Air Force Pilot Shortage? AFIT/ENS/MS/18J-023. Faculty Advisor: Lt Col Jason J. Anderson. Sponsor: AMC.

HAVKO, ANDREW C., Military Flight Operations Quality Assurance (MFOQA) Derived Fuel Modeling for the C-17 AFIT/ENS/MS/18J-028. Faculty Advisor: Col Adam D. Reiman. Sponsor: AMC.

HERSHEY, MICHAEL Z., C-17 Scenario-Based Training: Case Study Analysis AFIT/ENS/MS/18J-029. Faculty Advisor: Col Adam D. Reiman. Sponsor: AMC.

KOETHER, STEPHEN J., Rapid Global Mobility through Space AFIT/ENS/MS/18J-033. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: AMC.

LAD, NIRAV D., Utilizing Sources Of Airlift Channel Variability To Predict Time Definite Delivery AFIT/ENS/MS/18J-034. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AMC. [COA]

LANDIN, THERESE C., Training How We Fight: A Case Study of Mobility Guardian 2017 AFIT/ENS/MS/18J-035. Faculty Advisor: Lt Col Jason J. Anderson. Sponsor: AMC.

LARAS, FRANK S., Redefining Force Structures and Joint Training: Pope Army Airfield's Commitment to the Rapid Global Mobility of the 82nd Airborne Division AFIT/ENS/MS/18J-036. Faculty Advisor: Maj Matthew Roberts. Sponsor: AMC.

SARGENT, BROCK D., Tweeting Assurance: Korean Perceptions of President Trump's Tweets AFIT/ENS/MS/18J-048. Faculty Advisor: Dr. Melvin G. Deaile. Sponsor: 8 AF/CC.

SPRYS, JAMES C., Pilot Training Next: A Case Study for Air Mobility Command AFIT/ENS/MS/18J-050. Faculty Advisor: Col Matthew A. Douglas. Sponsor: AMC.

4.7. AIR FORCE SPACE COMMAND

MASTER'S THESES

HOUSER, CHASE M., Requirements for Cost Analysts. AFIT/ENV/MS/18M-209. Faculty Advisor: Dr. Robert D. Fass. Sponsor: SMC.

4.8. AIR FORCE SPECIAL OPERATIONS COMMAND

MASTER'S THESES

DEEHR, JOSH D., Improving Personnel Selection Through Value Focused Thinking. AFIT/ENS/MS/18M-117. Faculty Advisor: LTC Christopher M. Smith. Sponsor: AFSOC.

UHORCHAK, NICHOLAS M., Analysis of Incomplete SOCOM Selection Data. AFIT/ENS/MS/18M-167. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: AFSOC.

GRADUATE RESEARCH PAPERS

GILLILAND, KIEL R., Never Lost Sight of What's Important: The Strategy and Way Ahead for Improving In-Transit Visibility (ITV) for US Army Deployments AFIT/ENS/MS/18J-022. Faculty Advisor: Dr. William A. Cunningham. Sponsor: AFSOC.

4.9. USAF FIELD OPERATING AGENCIES/DIRECT REPORTING UNITS

AIR FORCE CIVIL ENGINEERING CENTER

MASTER'S THESES

BREUKER, JARED R., Phase Gate Implementation of Project Definition Rating Index (PDRI) on Air Force MILCON Project Development: A Comprehensive Analysis. AFIT/ENV/MS/18M-183. Faculty Advisor: Dr. Diedrich V. Prigge. Sponsor: AFCEC.

CLARK, SAMUEL M., United States Air Force Applications of Unmanned Aerial Systems: Modernizing Airfield Damage Assessment. AFIT/ENV/MS/18M-188. Faculty Advisor: Dr. David R. Jacques. Sponsor: AFCEC.

ERICKSON, JARED R., Influencing Effective Electrical Distribution Modernization through Advanced Metering. AFIT/ENV/MS/18M-201. Faculty Advisor: Lt Col Jeffrey C. Parr. Sponsor: AFCEC.

HORNSTEIN, THOMAS G., Life Cycle Analysis of Waste-to-Energy Conversion Technologies for Contingency DoD Deployed Forces. AFIT/ENV/MS/18M-208. Faculty Advisor: Dr. Jeremy M. Slagley. Sponsor: AFCEC.

IUNGERICH, JUSTIN M., Comprehensive Comparison of Steel Framed Fabric and Conventionally Constructed Aircraft Hangars. AFIT/ENV/MS/18M-211. Faculty Advisor: Dr. Diedrich V. Prigge. Sponsor: AFCEC.

MAESTAS, BRENDAN J., Defining Success in Air Force Infrastructure Asset Management through Use of the Delphi Technique. AFIT/ENV/MS/18M-220. Faculty Advisor: Dr. John J. Elshaw. Sponsor: AFCEC.

MCGAHA, ROBERT J., UAS Applications in Air Force Civil Engineering Squadrons: A Labor Value Study. AFIT/ENV/MS/18M-223. Faculty Advisor: Dr. David R. Jacques. Sponsor: AFCEC.

RAMSEY, PHILIP A., Cost and Performance Difference of High Performance Sustainable Buildings. AFIT/ENV/MS/18M-230. Faculty Advisor: Dr. Diedrich V. Prigge. Sponsor: AFCEC.

WAITERS, ARIEL L., Land Cover Influence on Airborne Noise Propagation at USAF Installations. AFIT/ENV/MS/18M-242. Faculty Advisor: Dr. Eric G. Mbonimpa. Sponsor: AFCEC.

AIR FORCE COST ANALYSIS AGENCY

MASTER'S THESES

BUNECKE, KIRSTEN, Improving Annual Fixed Wing Aircraft Maintenance Cost Estimates through Cost Estimating Relationships. AFIT/ENC/MS/18M-185. Faculty Advisor: Dr. Edward D. White. Sponsor: AFCAA.

AIR FORCE MEDICAL OPERATIONS AGENCY

MASTER'S THESES

MCEVOY, LINDSEY N., A Study of Military Health Care Costs: Direct Versus Purchased Care in a Geographical Region. AFIT/ENS/MS/18M-143. Faculty Advisor: Maj Heidi Tucholski. Sponsor: AFMOA. [COA]

PANG, SAMUEL H., Critical Issues in the Air Force Medical Equipment Procurement Process. AFIT/ENS/MS/18M-153. Faculty Advisor: Maj Timothy W. Breitbach. Sponsor: AFMOA.

AIR FORCE SAFETY CENTER

MASTER'S THESES

CLEMENTS, BRANDON M., They're Only Nuclear Weapons: An Exploratory Study of Safety Climate within the Nuclear Enterprise. AFIT/ENS/MS/18M-116. Faculty Advisor: Col Matthew A. Douglas. Sponsor: AFSEC.

AIR FORCE TECHNICAL APPLICATIONS CENTER

MASTER'S THESES

ANDERSON, PETER D., Machine Learning Approach to Identification of Seismic Events. AFIT/ENP/MS/18M-070. Faculty Advisor: Dr. James C. Petrosky. Sponsor: AFTAC.

NATIONAL AIR AND SPACE INTELLIGENCE CENTER

DOCTORAL DISSERTATIONS

CLAREY, MATTHEW P., Thermochemical Non-Equilibrium Models for Weakly Ionized Hypersonic Flows with Application to Slender-Body Wakes AFIT/ENY/DS/18S-059. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: NASIC.

LANE, CORY T., In-Scene Atmospheric Compensation of Thermal Hyperspectral Imaging with Applications to Simultaneous Shortwave Data Collection. AFIT/ENP/DS/17D-008. Faculty Advisor: Dr. Kevin C. Gross. Sponsor: NASIC. [CTISR]

MASTER'S THESES

SARGEANT, BENJAMIN N., Modeling and Analysis of Quantum Key Distribution Satellite Constellations. AFIT/ENY/MS/18M-292. Faculty Advisor: Lt Col Logan O. Mailloux. Sponsor: NASIC. [CSRA]

VANZANDT, PERRY K., Geosynchronous Belt Proximity Operations Mission Planner. AFIT/ENY/MS/18M-300. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: NASIC. [CSRA]

4.10. DEPARTMENT OF DEFENSE

MASTER'S THESES

ALMANNAEI, KHALED A., Operational Squadron Scheduling AFIT/ENS/MS/18S-029. Faculty Advisor: Maj Andrew J. Geyer. Sponsor: 28 OWS.

DONNDELINGER, GABRIEL D., A New Analysis of the Galvez Davison Index for Convective Forecasts in Northern Africa. AFIT/ENY/MS/18M-078. Faculty Advisor: Maj Hsien-Liang R. Tseng. Sponsor: 21 OWS.

GARZA, TANIA M., The geographic distribution of downburst frequency across Spaceport Florida. AFIT/ENP/MS/18M-082. Faculty Advisor: Maj Omar A. Nava. Sponsor: 45 WS.

HEDDERLY, RYAN W., Increased Capability in Electronic Warfare Systems for Flight Simulators and Laboratory Environments and the Effect on System Performance. AFIT/ENV/MS/18S-048. Faculty Advisor: Lt Col Amy M. Cox. Sponsor: 16 EWS.

HOLDEN, NANCY M., Forecasting Lightning Cessation using Dual-Polarization Radar and Lightning Mapping Array Near Washington, DC. AFIT/ENP/MS/18M-085. Faculty Advisor: Maj Omar A. Nava. Sponsor: 45 WS.

KUBALEK, SCOTT M., Finding an Optimal Theater Ammunition Distribution Strategy for United States Air Force in Europe. AFIT/ENS/MS/18M-132. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: USAF. [COA]

LANE, STEVEN T., Flexibility - Designing for Optionality on Warehouse Modernization Projects. AFIT/ENS/MS/18M-133. Faculty Advisor: Maj Timothy W. Breitbach. Sponsor: DLA.

OLSEN, SARAH A., Forecasting Lightning Initiation Utilizing Dual-Polarization Parameters Over Washington, DC. AFIT/ENP/MS/18M-092. Faculty Advisor: Maj Omar A. Nava. Sponsor: 45 WS.

SMITH, NATHAN D., Impacts of Sub-Auroral Polarization Streams on High Frequency Operations as a Function of Modeled Particle Energy Flux. AFIT/ENP/MS/18M-097. Faculty Advisor: Dr. Robert D. Loper. Sponsor: 2 WS.

THOMAS, JESSICA M., A Study of Collaboration between the Defense Logistics Agency and the US Agency for International Development in the Conduct of Humanitarian Operations. AFIT/ENS/MS/18M-164. Faculty Advisor: Col Matthew A. Douglas. Sponsor: DLA.

DEFENSE THREAT REDUCTION AGENCY

DOCTORAL DISSERTATIONS

FORD, MICHAEL A., Neutron Spectroscopy Using Rubberized Eu:LiCAF Wafers AFIT/ENP/DS/18S-024. Faculty Advisor: LTC Buckley E. O'Day. Sponsor: DTRA.

MASTER'S THESES

CONDON, ZACHARY T., Multisource Direction Identification Using a Rotating Scatter Mask. AFIT/ENP/MS/18M-073. Faculty Advisor: LTC Buckley E. O'Day. Sponsor: DTRA.

CRUZ, DIANA, Radiation Induced Defects in High-Z Shielded Ytterbium Doped Fibers. AFIT/ENP/MS/18M-074. Faculty Advisor: Maj Samuel D. Butler. Sponsor: DTRA.

DUNSMORE, ANITA N., Using an Astrophysical Model to Characterize Nuclear Dust. AFIT/ENP/MS/18M-079. Faculty Advisor: Dr. John W. McClory. Sponsor: DTRA.

HILL, DANIEL E., Lightning Prediction Using Artificial Neural Networks and Electric Field Mill Data. AFIT/ENC/MS/18M-002. Faculty Advisor: Lt Col Richard S. Seymour. Sponsor: 45 WS. [CSRA]

KEENE, IVAN G., Optimal Recovery of Critical Infrastructures after a Nuclear Attack. AFIT/ENS/MS/18M-131. Faculty Advisor: Dr. Richard F. Deckro. Sponsor: DTRA.

OLESEN, ROBERT J., Optimization and Parameter Characterization for Rotating Scatter Mask Designs. AFIT/ENP/MS/18M-091. Faculty Advisor: LTC Buckley E. O'Day. Sponsor: DTRA.

PITKINS, CHRISTOPHER R., Improving Fallout Characterization by Using Multivariate Techniques to Determine Composition. AFIT/ENP/MS/18M-080. Faculty Advisor: Dr. John W. McClory. Sponsor: DTRA.

STICKNEY, JASON R., Pulse Height Spectra Analysis of a Neutron Energy Tuning Assembly. AFIT/ENP/MS/18M-098. Faculty Advisor: Capt James E. Bevins. Sponsor: DTRA.

DOD CYBER CRIME CENTER

MASTER'S THESES

SCHELKOPH, DANIEL J., Digital Forensics Event Graph Reconstruction. AFIT/ENG/MS/18M-058. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: DC3. [CCR]

DIRECTED ENERGY JOINT TECHNOLOGY OFFICE

MASTER'S THESES

PETERSON, RICHARD D., Excited Argon 1s5 Production in Microhollow Cathode Discharges. AFIT/ENP/MS/18M-095. Faculty Advisor: Dr. Glen P. Perram. Sponsor: DEJTO.

JOINT AIRCRAFT SURVIVABILITY PROGRAM OFFICE

MASTER'S THESES

DURKEE, ANDREW D., Effects of Manufacturing Process Variables on Ultrasonic Testing in Electron Beam Melted Ti-6Al-4V. AFIT/ENY/MS/18M-254. Faculty Advisor: Capt Andrew J. Lingenfelter. Sponsor: JASPO.

JOINT CHIEF OF STAFF

MASTER'S THESES

NEUMANN, SARAH E., Forecasting Country Conflict within Modified Combatant Command Regions Using Statistical Learning Methods. AFIT/ENS/MS/18M-149. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: JCS.

JOINT MISSILE DEFENSE AGENCY

DOCTORAL DISSERTATIONS

DAVILA, RICARDO C., Two-Photon Excitation of Cesium Alkali Metal Vapor 72D, 82D Kinetics and Spectroscopy. AFIT/ENP/DS/18M-076. Faculty Advisor: Dr. Glen P. Perram. Sponsor: MDA. [CDE]

OFFICE OF THE SECRETARY OF DEFENSE

MASTER'S THESES

TIMME, DANIEL A., Modeling Multimodal Failure Effects of Complex Systems using polyWeibull Distribution. AFIT/ENV/MS/18M-239. Faculty Advisor: Maj Jason K. Freels. Sponsor: OSD.

UNITED STATES ARMY

DOCTORAL DISSERTATIONS

SALGADO, ETHAN L., The Military Inventory Routing Problem: Utilizing Heuristics Within a Least Squares Temporal Differences Algorithm to Solve a Multiclass Stochastic Inventory Routing Problem with Vehicle Loss AFIT/ENS/DS/18S-042. Faculty Advisor: Lt Col Matthew J. Robbins. Sponsor: TRADOC.

MASTER'S THESES

ALOMBRO, MATTHEW N., Small Arms Weapon Orientation and Position Estimation through Scenario-Based Simulations. AFIT/ENG/MS/18M-006. Faculty Advisor: Maj Scott J. Pierce. Sponsor: ARL HRED. [ANT]

APPLEBEE, JOSEPH A., A method to determine the viability of photovoltaic systems in various climate regions. AFIT/ENV/MS/18M-174. Faculty Advisor: Dr. Diedrich V. Prigge. Sponsor: NGB.

BOOKER, COREY J., Analysis of Temperature and Humidity Effects on Horizontal Photovoltaic Panels. AFIT/ENV/MS/18M-180. Faculty Advisor: Dr. Alfred E. Thal. Sponsor: NGB.

BUTT, SPENCER A., Cyber Data Anomaly Detection Using Autoencoder Neural Networks. AFIT/ENS/MS/18M-113. Faculty Advisor: Dr. Bradley C. Boehmke. Sponsor: ARCYBER. [COA]

DENNISON, PAUL P., Understanding And Developing Estimates Based On Practical Foundation Methods For Alaska's Discontinuous Permafrost Region. AFIT/ENV/MS/18M-195. Faculty Advisor: Dr. Diedrich V. Prigge. Sponsor: USACE CRREL.

EDLUND, CHRISTOPHER A., Quantifying Permafrost Extent, Condition, and Degradation Rates at Department of Defense Installations in the Arctic. AFIT/ENV/MS/18M-198. Faculty Advisor: Dr. Diedrich V. Prigge. Sponsor: USACE CRREL.

GALLAGHER, JAMES C., Market Basket Analysis with Shortened Web Link Click Data. AFIT/ENS/MS/18M-123. Faculty Advisor: LTC Christopher M. Smith. Sponsor: ARCYBER. [COA]

TRIGO, ALEXANDER M., Outlier Classification Criterion for Multivariate Cyber Anomaly Detection. AFIT/ENS/MS/18M-166. Faculty Advisor: Dr. Bradley C. Boehmke. Sponsor: ASC. [COA]

UNITED STATES NAVY

MASTER'S THESES

BOONE, EVAN R., An Analysis of Learning Curve Theory and the Flattening Effect at the End of the Production Cycle. AFIT/ENV/MS/18M-181. Faculty Advisor: Dr. John J. Elshaw. Sponsor: NPS.

HARRIS, MICHAEL J., Analytical Determination of a Helicopter Height Velocity Diagram. AFIT/ENV/MS/18M-260. Faculty Advisor: Dr. Donald L. Kunz. Sponsor: NAVAIR.

MALEC, MICHAEL P., Airborne Magnetic Anomaly Navigation Over Ocean Using Under Sampled Maps. AFIT/ENG/MS/18M-044. Faculty Advisor: Capt Aaron J. Canciani. Sponsor: ONR. [ANT]

MOUNT, LAUREN A., Navigation Using Vector and Tensor Measurements of the Earth's Magnetic Anomaly Field. AFIT/ENG/MS/18M-049. Faculty Advisor: Capt Aaron J. Canciani. Sponsor: ONR. [ANT]

NG, JUSTIN, Radial Basis Function Generated Finite Differences for the Nonlinear Schrodinger Equation. AFIT/ENC/MS/18M-004. Faculty Advisor: Maj Jonah Reeger. Sponsor: ONR.

PERKINS, MATTHEW W., Methodology to Analyze Tropical Cyclone Intensity from Microwave Imagery.
AFIT/ENP/MS/18M-094. Faculty Advisor: Lt Col Robert A. Stenger. Sponsor: JTWc.

GRADUATE RESEARCH PAPERS

GROVER, JUSTIN R., Meta-Analysis of Human Causal Factors in United States Submarine Force Collision Near
Misses AFIT/ENS/MS/18J-025. Faculty Advisor: Dr. Melvin G. Deaile. Sponsor: COMSUBRU 9.

UNITED STATES SPECIAL OPERATIONS COMMAND

MASTER'S THESES

MARD, RICHARD E., Modeling Water Security Issues Affecting Potential Migration and Conflict in Iran.
AFIT/ENS/MS/18M-140. Faculty Advisor: Dr. Richard F. Deckro. Sponsor: USSOCOM.

UNITED STATES TRANSPORTATION COMMAND

MASTER'S THESES

FROOM, CHELSEA T., Liner Workload Forecasting Augmented by Non-Traditional Data Sources.
AFIT/ENS/MS/18M-121. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: USTRANSCOM. [COA]

SMALL, MATTHEW T., Predicting Global Disposition of US Military Personnel via Open-Source, Unclassified
Means. AFIT/ENS/MS/18M-162. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: USTRANSCOM. [COA]

4.11. OTHER FEDERAL AGENCIES

DEPARTMENT OF HOMELAND SECURITY

MASTER'S THESES

BRADFORD-WINKLER, LUKE M., Variable Speed Simulation for Accelerated Industrial Control System Cyber Training. AFIT/ENG/MS/18M-014. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]

JEFFRIES, BLAINE M., Securing Critical Infrastructure: A Ransomware Study. AFIT/ENG/MS/18M-034. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]

DOMESTIC NUCLEAR DETECTION OFFICE

MASTER'S THESES

HOAK, STEVEN M., Native Defect Characterization of Single Crystal UO₂ Pre- and Post-Neutron Irradiation. AFIT/ENP/MS/18M-084. Faculty Advisor: Dr. James C. Petrosky. Sponsor: DNDO.

OSTLER, JAY E., Modeling an Actinide-Based, Direct-Conversion Neutron Detector. AFIT/ENP/MS/18M-093. Faculty Advisor: Dr. James C. Petrosky. Sponsor: DNDO.

ENVIRONMENTAL PROTECTION AGENCY

MASTER'S THESES

DAVENPORT, ANDREW W., Application of Ultraviolet Light Emitting Diodes for the Advanced Oxidation of Guar Gum. AFIT/ENV/MS/18M-193. Faculty Advisor: Dr. Willie F. Harper. Sponsor: EPA.

DYSON, SEAN M., Removal of Perfluorinated Compounds from Post-Emergency Wastewater by Advanced Oxidation Process and Granular Activated Carbon Adsorption. AFIT/ENV/MS/18M-197. Faculty Advisor: Lt Col John E. Stubbs. Sponsor: EPA.

KUNICKI, JOSEPH B., The Effect of Ammonia on the Germination and Outgrowth of *Bacillus globigii*. AFIT/ENV/MS/18M-217. Faculty Advisor: Dr. Willie F. Harper. Sponsor: EPA.

SANDERS, KEITH A., Radiological Decontamination in the Urban Environment Utilizing an Irreversible Wash-Aid Recovery System. AFIT/ENV/MS/18M-233. Faculty Advisor: Dr. Jeremy M. Slagley. Sponsor: EPA.

STUNTZ, SEAN M., The effect of MS2 bacteriophage on the activity and performance of activated sludge. AFIT/ENV/MS/18M-238. Faculty Advisor: Dr. Willie F. Harper. Sponsor: EPA.

4.12. NON-FEDERAL SPONSORS

DIRRECCION GENERAL DE MATERIAL

MASTER'S THESES

ALVAREZ, JOSE A., Analysis of Argentine A-4AR Aircraft Availability. AFIT/ENS/MS/18M-100. Faculty Advisor: Lt Col Jason J. Anderson. Sponsor: Direccion General de Material.

LABORATORY FOR TELECOMMUNICATIONS SCIENCES

MASTER'S THESES

DUCHANE, ALEXANDER W., Modeling a Space-Based Quantum Link. AFIT/ENG/MS/18M-020. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: Laboratory for Telecommunications Sciences.

THE OHIO STATE UNIVERSITY

MASTER'S THESES

TEWAHEFTEWA, JAMES G., Investigation of Geometric and Thermal Scaling Effects on Simulated Turbine Vane Leading Edge Model. AFIT/ENY/MS/18M-297. Faculty Advisor: Dr. Marcus D. Polanka. Sponsor: OSU.

UNIVERSITY OF MARYLAND MEDICAL CENTER

JOHNSON, JAKE E., Analysis of a Medical Center's Cardiac Risk Screening Protocol Using Propensity Score Matching. AFIT/ENC/MS/18M-129. Faculty Advisor: Lt Col Andrew J. Geyer. Sponsor: University of Maryland Medical Center.

TURKISH AIR FORCE

MASTER'S THESES

MERT, HUSEYIN, Flightline Simulation Modeling of a Squadron AFIT/ENS/MS/18S-038. Faculty Advisor: Dr. John O. Miller. Sponsor: TuAF. [COA]

5. ACADEMIC DEPARTMENT PUBLICATIONS AND FUNDING INFORMATION

5.1. DEPARTMENT OF AERONAUTICS AND ASTRONAUTICS

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5.1.1. DOCTORAL DISSERTATIONS

BOHAN, BRIAN T., *Combustion Dynamics and Heat Transfer in an Ultra Compact Combustor*. AFIT/ENY/DS/18S-057. Faculty Advisor: Dr. Marcus D. Polanka. Sponsor: AFRL/RQ.

CLAREY, MATTHEW P., *Thermochemical Non-Equilibrium Models for Weakly Ionized Hypersonic Flows with Application to Slender-Body Wakes*. AFIT/ENY/DS/18S-059. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: NASIC.

CURTIS, DAVID H., *Satellite Articulation Sensing using Computer Vision*. AFIT/ENY/DS/18S-060. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

DELEON, ARMANDO, *Investigation of Several Methods of Evaluating Wear in a High-Speed Environment*. AFIT/ENY/DS/18M-249. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFOSR.

OLSEN, CHRISTOPHER C., *A Heuristic Method for Task Selection in Persistent ISR Missions Using Autonomous Unmanned Aerial Vehicles*. AFIT/ENY/DS/18S-067. Faculty Advisor: Dr. Donald L. Kunz. Sponsor: AFRL/RQ.

PRINCE, ERIC R., *Optimal Finite Thrust Guidance Methods for Constrained Satellite Proximity Operations Inspection Maneuvers*. AFIT/ENY/DS/18S-071. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

SCHWAAB, MATTHEW J., *Arrhenius Rate Chemistry Informed Inter-phase Source Terms (ARCIIST) for Macro-Scale Explosive Hydrocodes*. AFIT/ENY/DS/18S-072. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: AFOSR. [CTISR]

ZAKRAJSEK, ANDREW J., *The Investigation of Aircraft Tire Spin-Up Wear as a Function of Various Landing Parameters Through Experimentation, Computational Modeling, and Probabilistic Predictions*. AFIT/ENY/DS/18M-309. Faculty Advisor: Dr. Donald L. Kunz. Sponsor: 704 TG.

ZOLLARS, MICHAEL D., *Simplex Control Methods for Robust Convergence of Small Unmanned Aircraft Flight Trajectories in the Constrained Urban Environment*. AFIT/ENY/DS/18S-078. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RQ. [ANT]

5.1.2. MASTER'S THESES

- BEARDSLEY, JOSHUA-EDWARD C., *Evaluation of Computational Fluid Dynamics for Potential Use in Thermal Flash Characterization*. AFIT/ENY/MS/18M-259. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: AFNWC.
- BEASLEY, BRIAN A., *Investigation of a Pressure Wave Supercharger for an Industrial Diesel Engine*. AFIT/ENY/MS/18S-055. Faculty Advisor: Dr. Marcus D. Polanka. Sponsor: AFRL/RQ.
- CASTELLO, ANTHONY A., *A Study of the Hexakis Icosahedron Vacuum Lighter Than Air Vehicle and the Effects of Air Evacuation on the Structural Integrity*. AFIT/ENY/MS/18M-246. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFOSR.
- CERRI, JOSHUA T., *Thermal Testing of Fused Deposition Modeling Extended to an Orbital Environment*. AFIT/ENY/MS/18S-058. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: N/A. [CSRA]
- CHANG, DAYLE L., *Computational Investigation Using Bleed as a Method of Shock Stabilization*. AFIT/ENY/MS/18M-247. Faculty Advisor: Maj Darrell S. Crowe. Sponsor: AFRL/RQ.
- DAHLKE, JACOB A., *Optimal Trajectory Generation in a Dynamic Multi-Body Environment using a Pseudospectral Method*. AFIT/ENY/MS/18M-248. Faculty Advisor: Capt Joshua A. Hess. Sponsor: N/A. [CSRA]
- DEMARCO, KEVIN J., *Control, Characterization, and Cooling of an Ultra-Compact Combustor*. AFIT/ENY/MS/18M-250. Faculty Advisor: Dr. Marcus D. Polanka. Sponsor: AFOSR.
- DESROCHES, JEFFREY A., *Suppression of Vortex-Induced Vibrations for Elliptical Cylinders Using Mixed Convection*. AFIT/ENY/MS/18M-251. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFRL/RQ.
- DONNDELINGER, GABRIEL D., *A New Analysis of the Galvez Davison Index for Convective Forecasts in Northern Africa*. AFIT/ENY/MS/18M-078. Faculty Advisor: Maj Hsien-Liang R. Tseng. Sponsor: 21 OWS.
- DUANE, MARK C., *Constellation Design for SSA of a Direct Ascent Servicing Mission to the Geosynchronous Belt*. AFIT/ENY/MS/18M-253. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]
- DURKEE, ANDREW D., *Effects of Manufacturing Process Variables on Ultrasonic Testing in Electron Beam Melted Ti-6Al-4V*. AFIT/ENY/MS/18M-254. Faculty Advisor: Capt Andrew J. Lingenfelter. Sponsor: JASPO.
- FAY, THOMAS J., *Contextual Maneuver Estimation for Non-Cooperative Satellites in Proximity Operations*. AFIT/ENY/MS/18S-064. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]
- FISCHER, JACOB P., *Influence of Coolant Flow Rate Parameters in Scaling Gas Turbine Cooling Effectiveness on a Flat Plate*. AFIT/ENY/MS/18M-256. Faculty Advisor: Maj James L. Rutledge. Sponsor: AFRL/RQ.
- FRITTS, MICHAEL S., *Human Optimization and Performance Enhancement in Flight via Real-time Biofeedback (Project HAVE HOPE)*. AFIT/ENY/MS/18M-258. Faculty Advisor: Lt Col Chad Hale. Sponsor: 711 HPW/RH.
- GUMUCIO, LOGAN M., *Creep of Hi-Nicalon S Ceramic Fiber Tows at 1100°C In Air and In Silicic Acid-Saturated Steam*. AFIT/ENY/MS/18J-072. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.
- HARRIS, MICHAEL J., *Analytical Determination of a Helicopter Height Velocity Diagram*. AFIT/ENY/MS/18M-260. Faculty Advisor: Dr. Donald L. Kunz. Sponsor: NAVAIR.
- HIGGINS, NICHOLAS S., *Flying Qualities Evaluation of Unmanned Aircraft Using JSBSim*. AFIT/ENY/MS/18J-074. Faculty Advisor: Dr. Donald L. Kunz. Sponsor: AFRL/RQ.
- HOFFMAN, JEREMIAH R., *Passive Load Testing for Evaluation of Electromechanical Actuators*. AFIT/ENY/MS/18M-263. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFRL/RQ. [CSRA]

HOPE, DYLAN N., *An Efficient Euler Method to Predict Shock Migration on an Oscillating Straked Delta Wing Design*. AFIT/ENY/MS/18M-264. Faculty Advisor: Dr. Donald L. Kunz Sponsor: 96th TG.

HUDSON, KEITH A., *Application of Automated Balancing Methods for an Attitude Control Test Platform with Non-Orthogonal Masses*. AFIT/ENY/MS/18J-076. Faculty Advisor: Capt Andrew J. Lingenfelter. Sponsor: AFRL/RV. [CSRA]

HUFF, RILEY, *Design, Buildup, and Testing of a Radial Rotating Detonation Engine for a Compact Auxiliary Power Unit*. AFIT/ENY/MS/18M-266. Faculty Advisor: Dr. Marcus D. Polanka. Sponsor: AFRL.

KATZOVITZ, JUSTIN D., *Space-based Maneuver Detection and Characterization using Multiple Model Adaptive Estimation*. AFIT/ENY/MS/18M-268. Faculty Advisor: Capt Joshua A. Hess. Sponsor: N/A. [CSRA]

KOO, TAEHOI, *Architecting a reconnaissance satellite constellation for the Korean Peninsula*. AFIT/ENY/MS/18M-270. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A. [CSRA]

KROEGER, BRIAN G., *Creep of Hi-NicalonT S Ceramic Fiber Tows at 1000°C In Air and In Silicic Acid-Saturated Steam*. AFIT/ENY/MS/18M-271. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

LARUE, ROBERT B., *Algorithms for Small Satellite Formation Flying*. AFIT/ENY/MS/18M-273. Faculty Advisor: Lt Col Kirk W. Johnson. Sponsor: AFRL/RV. [CSRA]

LESAINT, MATTHEW T., *Monotonic Load and Creep Properties of Carbon Nanotube Sheets*. AFIT/ENY/MS/17D-024. Faculty Advisor: Maj Ryan P. O'Hara. Sponsor: N/A.

LIU, KAN B., *Design and Evaluation of an Additively Manufactured Lattice Optimized Actively Cooled Nose Cone*. AFIT/ENY/MS/18M-275. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFRL/RV. [CSRA].

MARCO, NICHOLAS J., *Wall-Modeled Large Eddy Simulation of a Three-Dimensional Shock-Boundary Layer Interaction*. AFIT/ENY/MS/18M-277. Faculty Advisor: Maj Jeffrey R. Komives. Sponsor: AFRL/RQ.

MINOR, SAVANNAH N., *Creep of N720/A Ceramic Matrix Composite with Laser Drilled Effusion Holes at 1200°C in Air and in Steam*. AFIT/ENY/MS/18M-279. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

MOORE, KYLE D., *Quasi-Static Nonlinear Analysis of a Celestial Icosahedron Shaped Vacuum Lighter Than Air Vehicle*. AFIT/ENY/MS/18M-280. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFOSR.

MORRIS, LEE R., *Study of Abnormal Grain Growth in Beta Annealed TI-6AL-4V Forgings*. AFIT/ENY/MS/18M-310. Faculty Advisor: Maj Ryan P. O'Hara. Sponsor: AFRL/RX.

NACITA, ISAAC M., *Modeling and Test Results of a CubeSat Shape Memory Alloy Helical Antenna Array*. AFIT/ENY/MS/18M-281. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

OCAMPO, RODRIGO I., *CubeSat Deployable Solar Panel Hinge Using Nitinol Smart Memory Alloy*. AFIT/ENY/MS/18M-282. Faculty Advisor: Maj Ryan P. O'Hara. Sponsor: N/A. [CSRA]

OREN, EVAN P., *Three-Dimensional Wall Effects of a Scramjet Cavity Flameholder*. AFIT/ENY/MS/18S-068. Faculty Advisor: Maj Jeffrey R. Komives. Sponsor: AFRL/RQ. [CTISR]

PATEL, AADIT A., *Multi-Material Topology Optimized Perforator*. AFIT/ENY/MS/18M-285. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFRL/RW.

PRY, GLEN E., *Creep of Hafnium Diboride -20 Vol% Silicon Carbide at 1500°C in Air*. AFIT/ENY/MS/18M-286. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFOSR.

RAMOS, VON DRAKE L., *Vulnerability Assessment of the Smallest Agile Transmit Receive Network (SATRN) Software Suite*. AFIT/ENY/MS/18M-288. Faculty Advisor: Dr. Robert F. Mills. Sponsor: N/A. [CSRA]

ROBERTS, KARSON A., *Design and Testing of an Additively Manufactured CubeSat Structural Bus*. AFIT/ENY/MS/18M-289. Faculty Advisor: Maj Ryan P. O'Hara. Sponsor: N/A. [CSRA]

ROCKER, CHRISTOPHER C., *The Study and Application of Carbon Nanotube Film Heaters for Space Applications*. AFIT/ENY/MS/18M-290. Faculty Advisor: Maj Ryan P. O'Hara. Sponsor: N/A. [CSRA]

SARGEANT, BENJAMIN N., *Modeling and Analysis of Quantum Key Distribution Satellite Constellations*. AFIT/ENY/MS/18M-292. Faculty Advisor: Lt Col Logan O. Mailloux. Sponsor: NASIC. [CSRA]

SPENDEL, DAVID F., *Parameter Study of an Orbital Debris Defender Using Two Team, Three Player Differential Game Theory*. AFIT/ENY/MS/18M-295. Faculty Advisor: Capt Joshua A. Hess. Sponsor: N/A. [CSRA]

TEWAHEFTEWA, JAMES G., *Investigation of Geometric and Thermal Scaling Effects on Simulated Turbine Vane Leading Edge Model*. AFIT/ENY/MS/18M-297. Faculty Advisor: Dr. Marcus D. Polanka. Sponsor: OSU.

TOMLIN, DESTINY B., *Creation and Presentation of a Systems-Level Model for an AF-M315E Monopropellant Micro-Thruster*. AFIT/ENY/MS/18S-075. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: N/A. [CSRA]

WATERS, MICHAEL C., *Analysis of Additively Manufactured Injectors for Rotating Detonation Engines*. AFIT/ENY/MS/18M-301. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFRL/RQ. [CSRA]

WERNER, CALEB J., *Military Utility Analysis of RF Geolocation via Quadrifilar Antennas Onboard a CubeSat*. AFIT/ENY/MS/18M-302. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

WHITMAN, JOSEPH R., *Application of Spectral Solution and Neural Network Techniques in Plasma Modeling for Electric Propulsion*. AFIT/ENY/MS/18S-076. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFRL/RQ. [CSRA]

WILCOX, STEFFAN M., *Tensile Properties and Fatigue Behavior of Geopolymer Matrix Composites with Carbon Fiber Reinforcement at Elevated Temperature*. AFIT/ENY/MS/18M-304. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RQ.

WISE, LEE F., *Modeling of Store Separation Effects on a Specific Self-Defense Missile*. AFIT/ENY/MS/18M-306. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: N/A.

VANZANDT, PERRY K., *Geosynchronous Belt Proximity Operations Mission Planner*. AFIT/ENY/MS/18M-300. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: NASIC. [CSRA]

5.1.3. FACULTY BIOGRAPHIES & RESEARCH OUTPUT

Notes: Research Center affiliations are listed in [] if applicable. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

BETTINGER, ROBERT A., Maj,

Assistant Professor of Astronautical Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2017 (AFIT/ENY); BS, Astronautical Engineering, United States Air Force Academy, 2007; MA, History, American Public University, 2010; MS, Astronautical Engineering, Air Force Institute of Technology, 2011; PhD, Astronautical Engineering, Air Force Institute of Technology, 2014. Maj Bettinger's research interests include reentry dynamics, spacecraft safety and survivability, as well as optimization and control for aerospace applications. Recent research includes developing uncontrolled reentry prediction algorithms and skip reentry maneuver optimization. He is a member of Tau Beta Pi and Sigma Gamma Tau. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4578, email: Robert.Bettinger@afit.edu

SPONSOR FUNDED EDUCATIONAL PROJECTS

“Aerospace Control, Estimation, and Stochastics (ACES) I Short Course.” Sponsor: NASIC. Funding: \$20,000 – Bettinger 20%, Cobb 20%, Hartsfield 20%, Johnson 20%. [CSRA]

COBB, RICHARD G.,

Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2001 (AFIT/ENY); BS, Pennsylvania State University, 1988; MS, Air Force Institute of Technology, 1992; PhD, Air Force Institute of Technology, 1996. While at AFIT, Dr. Cobb has taught graduate level courses in satellite design, optimal control, trajectory optimization, system identification and spacecraft control systems. His research focuses on dynamics and control of aerospace systems, including control of aircraft, spacecraft, large flexible structures, and optical systems. Recent work includes developing optimal trajectory plans for Global Strike missions, optimal aircraft air and ground collision avoidance algorithms for manned and unmanned systems, active buffet alleviation using piezoelectric actuators for F-16 aircraft, maneuver planning for satellite proximity operations, dynamics and control techniques for lightweight space optics and optimal/novel sensor systems and architectures for enhancing Space Situational Awareness. While on active duty, Dr. Cobb served as the technical advisor for AFRL's Space Vehicles Technology Branch, and led several space flight experiment programs, including the Vibration Isolation and Suppression System sponsored by BMDO and the Satellite Ultra-quiet Isolation Technology Experiment. Dr. Cobb also served as a launch operations officer at Cape Canaveral AFS on the Global Positioning System program, responsible for the integration and launch of the GPS Block II satellite constellation. He is an Associate Fellow of AIAA. AFIT research center affiliation(s): ANT, CDE, CSRA and CTISR. Tel. 937-255-3636 x4559, email: Richard.Cobb@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Optimization and Computer Vision for Proximity Operations.” Sponsor: Undisclosed. Funding: \$35,000. [CSRA]

“Optimization for Tactical Off-Board Sensing and Persistent Intelligence, Surveillance, and Reconnaissance.” Sponsor: AFRL/RQ. Funding: \$35,000 – Cobb 50%, Kunz 50%. [ANT]

“Trajectory Optimization Applications for Loyal Wingman and Missile Avoidance.” Sponsor: AFRL/RQ. Funding: \$15,000. [ANT]

“Space Domain Modeling & Simulation via High Performance Computing.” Sponsor: Undisclosed. Funding: \$200,000 – Cobb 50%, Meyer 50%. [CSRA]

“AFIR Support for the Orbital Engagement Maneuver (OEM) Integrated Validation Team (IVT).” Sponsor: AFSPC. Funding: \$100,000 – Cobb 25%, Hess 25%, Johnson 25%, Meyer 25%. [CSRA]

“Optimization and Decision Support for TMAP.” Sponsor: NASIC. Funding: \$35,000. [CSRA]

“Daytime Imaging for Persistent Space Situational Awareness.” Sponsor: AFRL/RV. Funding: \$50,000. [CSRA]

REFEREED JOURNAL PUBLICATIONS

- Prince, E. and Cobb, R., "Optimal Inspector Satellite Guidance to Quasi-Hover via Relative Teardrop Trajectories," *Acta Astronautica*, February 15, 2018, <https://doi.org/10.1016/j.actaastro.2018.02.017>. [CSRA]
- Carr, R.W., Cobb, R.G., Pachter, M. and Pierce, S., "Solution of a Pursuit–Evasion Game Using a Near-Optimal Strategy," *Journal of Guidance, Control, and Dynamics*, Vol. 41, No. 4, 2018, pp. 841-850. <https://doi.org/10.2514/1.G002911>. [ANT]
- Sargeant, B.N., Mailloux, L.O. and Cobb, R.G., "Analysis of Quantum Key Distribution Satellite Constellations," *Journal of Defense Research & Engineering*, Vol. 1, Issue 2, August 2018. AD1058504. [CSRA]
- Curtis, D and Cobb, R., "Noncooperative Satellite Articulation Characterization and Tracking with Computer Vision," *Journal of Defense Research & Engineering*, Vol. 1, Issue 2, August 2018. AD1058499. [CSRA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

- Zollars M.D., Cobb R.G. and Grymin D.J., "Optimal Path Planning for SUAS Target Observation through Constrained Urban Environments using Simplex Methods" IEEE American Controls Conference, Milwaukee WI, 27-29 June 2018.
- Curtis, D, and Cobb, R., "Illumination effects on satellite articulation characterization from a trajectory matrix using optimization," IEEE Aerospace Conference, Big Sky MT, 3-10 March 2018. [CSRA]
- Zollars M.D., Cobb R.G. and Grymin D.J., "Optimal Path Planning for SUAS Waypoint Following in Urban Environments," IEEE Aerospace Conference, Big Sky MT, 3-10 March 2018. [ANT]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

- Stern, J., Wachtel, S., Colombi, J., Meyer D. and Cobb, R. (2018), "Multi-objective Optimization of Geosynchronous Earth Orbit Space Situational Awareness Systems via Parallel Executable Architectures," 2017 Disciplinary Convergence in Systems Engineering Research. Springer, Cham, https://doi.org/10.1007/978-3-319-62217-0_42. [CSRA]
- Curtis, D and Cobb, R., "Satellite Articulation Tracking Using Monocular Computer Vision" AAS 41st Annual Guidance and Control Conference, (AAS 18-097) Breckenridge CO, 5-9 Feb 2018. [CSRA]
- Zollars M.D., Cobb R.G. and Grymin D.J., "Simplex Optimal Control Methods for Urban Environment Path Planning," AIAA Information Systems-AIAA Infotech @ Aerospace, AIAA SciTech Forum, 8-12 January 2018, Kissimmee FL, (AIAA 2018-2259) <https://doi.org/10.2514/6.2018-2259>.
- Prince, E. and Cobb, R., "Optimal Guidance for Relative Teardrops with Lighting and Collision Constraints," AIAA Guidance, Navigation, and Control Conference, AIAA SciTech Forum, 8-12 January 2018, Kissimmee FL, (AIAA 2018-0867) <https://doi.org/10.2514/6.2018-0867>. [CSRA]
- Zollars, M.D. and Cobb R.G., "Simplex Methods for Optimal Control of Unmanned Aircraft Flight Trajectories," ASME. Dynamic Systems and Control Conference, Tysons VA, October 11–13, 2017, doi: 10.1115/DSCC2017-5031.

CROWE, DARRELL S., Maj,

Student Operations Division Chief and Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2015 (AFIT/ENY); BS, Aerospace Engineering, Texas A&M, 2003; MS, Aeronautical Engineering, Air Force Institute of Technology, 2008; PhD, Aeronautical Engineering, Air Force Institute of Technology, 2014. Maj Crowe's research interests include computational fluid dynamics, weapon aerodynamics, propulsion systems integration, fuel film cooling, and grid generation methods. He teaches courses on computational fluid dynamics. Maj Crowe has experience in propulsion sustainment engineering and has worked as a

computational fluid dynamics engineer in the area of aircraft/store compatibility. He has also deployed to Kuwait in support of Operation Inherent Resolve. Maj Crowe is a member of Tau Beta Pi, Sigma Gamma Tau, and a senior member of AIAA, where he is a member of the Inlets, Nozzles, and Propulsion Systems Integration technical committee. Tel. 937-255-3636 x4204, email: Darrell.Crowe@afit.edu

REFEREED JOURNAL PUBLICATIONS

Bills, J., Crowe, D. S., Rutledge, J., and Coy, E. "Modeling Fuel Film Cooling on a Flat Plate," *Journal of Thermophysics and Heat Transfer*, Vol. 32, No. 3, 2018, pp. 736-746.

FREEMAN, JACOB A., Lt Col,

Deputy Head and Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2015 (AFIT/ENY); BS, Mechanical Engineering, Brigham Young University, 1997; MS, Aeronautical Engineering, Air Force Institute of Technology, 2003; PhD, Aeronautical Engineering, Virginia Tech, 2012. Lt Col Freeman's research interests include computational fluid dynamics, optimization under uncertainty, and computational turbulence modeling. He has experience as the GPS deputy chief engineer; computational aircraft-store separation; computational, experimental and flight-testing of a micro air vehicle; small-satellite testing, launch and operations; and as assistant professor of aeronautical engineering at the Air Force Academy. Lt Col Freeman also deployed to Guantanamo Bay, Cuba, to support Operation Enduring Freedom and to US Central Command Headquarters in Florida as a military strategic planner. He is an Associate Fellow of AIAA. Tel. 937-255-3636 x4901, email: Jacob.Freeman@afit.edu

FULLER, DANE F., Col

Senior Military Professor, School of Engineering and Management, AFIT Appointment Date: 2016 (AFIT/EN); BS Electrical Engineering, The University of Texas at Austin, 1993; MS Electrical Engineering, Air Force Institute of Technology, 1997; MS of Operational Art and Science, Air Command and Staff College, 2008, PhD Electrical Engineering, Air Force Institute of Technology, 2011. Col Fuller had over 23 years of active duty military service and experience. His research interests included space systems engineering and remote sensing, in particular radar imaging, electromagnetic scattering, and pattern recognition. Col Fuller is a member of Tau Beta Pi, and Eta Kappa Nu. AFIT research center affiliation(s): CSRA and CTISR. He retired in 2018.

SPONSOR FUNDED RESEARCH PROJECTS

"Program Analyst for Integrated Air and Missile Defense." Sponsor: MDA. Funding: \$77,797. [CSRA]

"GEO SSA Architecture Study." Sponsor: AFRL/RV. Funding: \$50,000 – Fuller 20%, Bettinger 20%, Hartsfield 40%, Cobb 20%. [CSRA]

"Jetson TX2 PC104 Board." Sponsor: Undisclosed. Funding: \$110,098 – Fuller 40%, Hartsfield 30%, Cobb 30%. [CSRA]

"EO-IR Satellite Study." Sponsor: Undisclosed. Funding: \$50,000 – Fuller 20%, Bettinger 20%, Hartsfield 40%, Cobb 20%. [CSRA]

"Grissom 6U Bus with Beacon." Sponsor: Undisclosed. Funding: \$50,000 – Fuller 25%, Johnson 25%, Cobb 25%, Hartsfield 25%. [CSRA]

GREENDYKE, ROBERT B.,

Associate Professor of Aeronautics and Astronautics and Director, AFIT Scientist and Engineer Education Programs at Kirtland AFB, Department of Aeronautics and Astronautics, Appointment Date: 2005 (AFIT/ENY); BBA, Economics, Baylor University, 1979; BS, Aerospace Engineering, Texas A&M University, 1986; MS, Aerospace Engineering, Texas A&M University, 1988; PhD, Interdisciplinary Engineering, Texas A&M University, 1998. Dr. Greendyke's research interests include computational fluid dynamics, Direct Simulation Monte Carlo methods, hypersonic and reacting flows, radiation simulation, thermophysics, and plasma simulation. He was a Research Scientist at NASA-

Langley Research Center studying re-entry and aerobraking flows, and an Associate Professor in the University of Texas at Tyler establishing a start-up Mechanical Engineering Program from concept through accreditation. Dr. Greendyke has published over 30 journal articles, technical reports and conference publications in multiple fields. He is an Associate Fellow of the American Institute of Aeronautics and Astronautics. Tel. 937-255-3636 x4567, email: Robert.Greendyke@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Hypersonic Stability and Transition Analysis.” Sponsor: AFRL/RW. Funding: \$75,000.

“An Examination of Hypersonic Wake Phenomenon and Application to Foreign Threat Vehicle Assessment.”
Sponsor: NASIC. Funding: \$114,450.

HARTSFIELD, CARL R.,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2015 (AFIT/ENY); BS, Aerospace Engineering, Georgia Institute of Technology, 1991; MS, Aeronautical Engineering, Air Force Institute of Technology, 2001; PhD, Astronautical Engineering, Naval Postgraduate School, 2006. Dr. Hartsfield is a former faculty member of The Ohio State University, former space sensor payload program manager, and retired USAF Lt Col. His research interests include space and rocket propulsion and optimal design of spacecraft, including integration and testing of spacecraft. Dr. Hartsfield’s research focuses on experimental evaluation and diagnostics for space propulsion, analytic evaluation of spacecraft design, and applications of additive manufacturing for optimal spacecraft structures. He served as an invited space propulsion session co-chair at a 2011 NASA GRC HBCUOMI Outreach Symposium, as a session chair at the 2011 and 2012 Dayton/Cincinnati Aerospace Sciences Symposia, as chair for the technical program and session chair at the 2017 Dayton/Cincinnati Aerospace Sciences Symposium and Executive Chair for the 2018 Dayton/Cincinnati Aerospace Sciences Symposium. Dr. Hartsfield is a member of AIAA, Sigma Gamma Tau, and the American Society for Engineering Education. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4667, email: Carl.Hartsfield@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Design for Satellite Structures Built In Space.” Sponsor: Undisclosed. Funding: \$89,375 – Hartsfield 50%, O’Hara 50%. [CSRA]

“Accion Thruster Evaluation.” Sponsor: Undisclosed. Funding: \$83,750. [CSRA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Wright, S.D., and Hartsfield, C.R., “Characterization and Analysis of Anomalous Diffusion Modes in a 600W Permanent Magnet Hall Thruster,” AIAA-2018-1504, 56th AIAA Aerospace Sciences Meeting, 10 January 2018. [CSRA]

Sheets, B., and Hartsfield, C.R., “Pseudo Linear Hall Effect Thruster Characterization through Potential, Magnetic, and Optical Measurements,” AIAA-2018-2198, 56th AIAA Aerospace Sciences Meeting, 12 January 2018. [CSRA]

McCrea, J., Cerri, J.T., and Hartsfield, C.R., “Design of a Zero-Gravity, Vacuum-Based 3D Printer Robot for Use of In-Space Satellite Assembly,” AIAA-2018-2201, 56th AIAA Aerospace Sciences Meeting, 12 January 2018. [CSRA]

HESS, JOSHUAH, A., Capt,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2016 (AFIT/ENY); BS, Aerospace Engineering, Virginia Polytechnic and State University, 2009; MS, Astronautical Engineering, Air Force Institute of Technology, 2011; PhD, Aeronautical Engineering, Air Force Institute of Technology, 2016. Capt Hess’s research interests include orbital mechanics, spacecraft attitude determination, relative satellite motion and spacecraft proximity operations, estimation theory, differential pursuit/evasion games, and optimal control theory. He has investigated adaptive estimation of nonlinear spacecraft attitude dynamics as well as the relative

navigation between satellites conducting proximity operations. Previously, Capt Hess worked as a space system engineer at the National Air and Space Intelligence Center (NASIC), and has deployed to Southwest Asia in support of Operation Enduring Freedom. He is a member of Tau Beta Pi, Sigma Gamma Tau, and AIAA. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4713, email: Joshuah.Hess@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Pursuit-Evasion Differential Games for Relative Satellite Motion with Incomplete Information.” Sponsor: AFRL/RV. Funding: \$12,500. [CSRA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Prince, E. R., Hess, J.A., Carr, R.W., Cobb, R.G., “Elliptical Orbit Proximity Operations Differential Games,” 2018 AAS/AIAA Astrodynamics Specialist Conference (AAS 18-462). [CSRA]

Harris, M. J., Kunz, D. L., and Hess, J.A., “Analytical Determination of a Helicopter Height-Velocity Curve,” AIAA 2018-3258, 2018 Modeling and Simulation Technologies Conference, AVIATION Forum, 19-23 August 2018, Snowbird, UT.

JOHNSON, KIRK, W., Lt Col,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2016 (AFIT/ENY); BS, Mechanical Engineering, Worcester Polytechnic Institute, 2000; MS, Astronautical Engineering, Air Force Institute of Technology, 2010; PhD, Aerospace Engineering, Texas A&M University, 2016. Lt Col Johnson's research interests include orbital mechanics and astrodynamics, focusing on satellite relative motion, formation flying, general perturbation methods, and space navigation. He has led engineering teams performing analysis and modeling and simulation for the National Air and Space Intelligence Center and for the Missile Defense Agency. He is a member of Tau Beta Pi, Sigma Gamma Tau, and the American Astronautical Society. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4285, email: Kirk.Johnson@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Propellantless Satellite Formation Control for LCE (Laser Crosslink Experiment).” Sponsor: SPAWAR. Funding: \$24,000. [CSRA]

“Grissom 6U CubeSat Bus.” Sponsor: AFRL/RV. Funding: \$96,300. [CSRA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

LaRue, R.B., and Johnson, K.W., “Reconfiguration of Small-Satellite General Circular Orbit Formations,” AIAA 2018-2219, AIAA SciTech Forum, Orlando, Florida, January 2018. [CSRA]

LaRue, R.B., and Johnson, K.W., “Algorithms for Small Satellite Formation Initialization,” American Astronautical Society Paper 18-231, presented at the AAS/AIAA Astrodynamics Specialist Conference, Snowbird, UT, August 2018. [CSRA]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

LaRue, R.B., and Johnson, K.W., “Algorithms for Small Satellite Formation Flying,” Dayton-Cincinnati Aerospace Sciences Symposium, February 2018. [CSRA]

KOMIVES, JEFFREY R., Maj,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2016 (AFIT/ENY); BS, Aeronautical & Astronautical Engineering, Purdue University, 2003; MS, Aeronautical Engineering, Air Force Institute of Technology, 2009; PhD, Aerospace Engineering & Mechanics, University of Minnesota, 2016. Maj Komives' research interests include aerodynamics, hypersonics, and computational fluid

dynamics. He is a developmental engineer with experience in simulation, test and evaluation, and electronic warfare. In his deployment to Operation Enduring Freedom he was responsible for Counter Remote Controlled-IED Electronic Warfare training across most of Afghanistan. Maj Komives is a member of Sigma Gamma Tau, AIAA, and Association of Old Crows. AFIT research center affiliation(s): CSRA and CTISR. Tel. 937-255-3636 x4744, email: Jeffrey.Komives@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“High Speed Inlet Parametric Design Analysis and Support.” Sponsor: NASIC. Funding: \$24,999.

“Verification and Validation of Signature Codes for Hypersonic Modeling.” Sponsor: AFRL/RV. Funding: \$26,300. [CSRA]

“Hypersonic Boundary Layer Modeling Supporting AEDC Tunnel 9.” Sponsor: AEDC. Funding: \$25,725.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Oren, E.P., Komives, J.R., & Peterson, D.M. “Large Eddy Simulation of Three Dimensional Wall Effects in a Scramjet Cavity Flameholder.” 2018 Fluid Dynamics Conference, 2018.

Gross, K., Komives, J.R., Kerst, A., and Oren, E. P., “Investigation of a Scramjet Flowfield with Hyperspectral Imaging Augmented by Large Eddy Simulation.” 53rd 3AF International Conference on Applied Aerodynamics, Salon-de-Provence, France, 2018. [CTISR]

Marco, N., and Komives, J.R., “Wall-Modeled Large Eddy Simulation of a Three-Dimensional Shock-Boundary Layer Interaction.” 2018 AIAA Aerospace Sciences Meeting, 2018.

KUNZ, DONALD L.,

Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2003 (AFIT/ENY); BS, Syracuse University, 1971; MS, Georgia Institute of Technology, 1972; PhD, Georgia Institute of Technology, 1976; Dr. Kunz’s research interests include rotorcraft dynamics, vibrations, and loads, structural dynamics, aeroelasticity, flying qualities of UAVs, multibody dynamics, and computational structural mechanics. He has published more than 100 journal articles, conference papers, and technical reports. Prior to coming to AFIT, Dr. Kunz worked at the US Army Aeroflightdynamics Directorate, McDonnell Douglas Helicopter Company, Old Dominion University, and the US Army Aviation and Missile Command. He is an Associate Fellow of AIAA, a member of AHS, and a licensed professional engineer in the Commonwealth of Virginia. Tel. 937-255-3636 x4548, email: Donald.Kunz@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Research Support for Joint AFIT/TPS Test Management Projects.” Sponsor: USAF TPS. Funding: \$45,000.

“Basic Research with Integrated Flight Test.” Sponsor: AFOSR. Funding: \$93,025 – Kunz 50%, Reeder 20%, Cobb 20%, Crowe 10%.

REFEREED JOURNAL PUBLICATIONS

Kim, J.P. and Kunz, D.L., “Handling Qualities Assessment of an Unmanned Aircraft Using Performance and Workload Metrics,” *Journal of Guidance, Control and Dynamics*, Vol. 40, No. 10, October 2017, pp. 2701-2709, doi: 10.2514/1.G002306.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Olsen, C.C., and Kunz, D.L., “Autonomous Aerial Modeling with Operational Constraints,” International Conference on Unmanned Aircraft Systems, Dallas, Texas, June 2018, doi: 10.1109/ICUAS.2018.8453364.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Harris, M.J., Kunz, D.L., and Hess, J.A., “Analytical Determination of a Helicopter Height-Velocity Curve,” AIAA 2018-3258, Modeling and Simulation Technologies Conference, 2018 AIAA Aviation and Aeronautics Forum and Exposition, Atlanta, GA, June 2018, doi: 10.2514/6.2018-3258.

Hamidani, A.M., and Kunz, D.L., “Evaluating the Autonomous Flying Qualities of a Simulated Variable Stability Aircraft,” AIAA 2018-1019, AIAA Atmospheric Flight Mechanics Conference, AIAA SciTech Forum, Orlando, Florida, January 2018, doi: 10.2514/6.2018-1019.

Olsen, C.C., and Kunz, D.L., “A Utility Approach to UAS-Based Persistent ISR,” AIAA 2018-1894, AIAA Information Systems-AIAA Infotech @ Aerospace, AIAA SciTech Forum, Orlando, Florida, January 2018, doi: 10.2514/6.2018-1894.

LIEBST, BRADLEY S.,

Professor of Aerospace Engineering and Head, Department of Aeronautics and Astronautics, AFIT Appointment Date: 1989 (AFIT/ENY); BS, Wichita State University, 1978; MS, Massachusetts Institute of Technology, 1979; PhD, Massachusetts Institute of Technology, 1981. Dr. Liebst's research interests include eigenstructure assignment and control, stability and control of aerospace vehicles, passive and active control of large flexible structures, and aircraft handling qualities. He has published over 30 articles and reports and chaired over 40 theses and dissertations. Prior to teaching at AFIT, Dr. Liebst was Assistant Professor of Aerospace Engineering for six years at the University of Minnesota where he was voted the 1987 Best Institute of Technology (U of M) Professor. Tel. 937-255-3636 x4636, email: Bradley.Liebst@afit.edu

LINGENFELTER, ANDREW J., Capt,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2016 (AFIT/ENY); BS, Mechanical Engineering, University of Nebraska – Lincoln, 2008; MEng, Industrial and Systems Engineering, University of Florida, 2011; PhD, Aeronautical Engineering, Air Force Institute of Technology, 2016. Capt Lingenfelter's research interests include aircraft survivability, weapons, weapons testing, and additive manufacturing. His previous research has focused on flow visualization and ballistically induced failure of aircraft fuel tanks. Capt Lingenfelter is a member of AIAA, Tau Beta Pi, and Sigma Gamma Tau. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4282, email: Andrew.Lingenfelter@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Separation Modeling of Military Standard 1760 Aircraft Store Electrical Interconnection System.” Sponsor: AFLCMC. Funding: \$7,629.

“Vacuum Casting of Spacecraft Structure.” Sponsor: Undisclosed. Funding: \$37,564 – Lingenfelter 34%, Hartsfield 33%, Hess 33%.

SPONSOR FUNDED EDUCATIONAL PROJECTS

“Weapons and Aircraft Survivability Education and Research.” Sponsor: JASPO. Funding: \$79,000.

REFEREED JOURNAL PUBLICATIONS

Lingenfelter, A.J., Liu, D., and Reeder, M.F., “Time resolved flow field measurements of orifice entrainment during a hydrodynamic ram event.” *Journal of Visualization*, Vol. 20, Issue 1, Pages 63-74, 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Tatman, L., Lingenfelter, A.J., and Liu, D., “Flow Properties through a Ballistically Generated Orifice During a Hydrodynamic Ram Event.” 2018 AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, 2018.

Cobb, G., Lingenfelter, A., Nesmith, A., and O'Hara, R., "Vibrational Properties of Additively Manufactured Inconel 718," 56th AIAA Aerospace Sciences Meeting, AIAA 2018-0489, 2018. [CSRA]

Durkee, A., Lingenfelter, A.J., and Liu, D., "Ultrasonic Testing of Manufactured Voids in Electron Beam Melted Ti-6Al-4V." 2018 AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, 2018.

MALL, SHANKAR,

Distinguished Professor, Department of Aeronautics and Astronautics, AFIT Appointment Date: 1986 (AFIT/ENY); BS, Mechanical Engineering, Banaras Hindu University, India, 1964; MS, Mechanical Engineering, Banaras Hindu University, 1966; PhD, Mechanical Engineering, University of Washington, 1977. Dr. Mall's research centered on composite and smart materials, fatigue and fracture. Dr. Mall has authored over 300 papers and has been the co-editor of a book and five conference proceedings. He was a Fellow of ASME and an Associate Fellow of AIAA. He was also the Principal Materials Research Engineer, Materials and Manufacturing Directorate, Air Force Research Laboratory.

REFEREED JOURNAL PUBLICATIONS

Cobb, G.R., Singh, A.K., and Mall, S., "In-situ characterization of microstructural changes in a carbon nanotube sheet under sustained load." *Journal of Materials & Design*, Vol. 134, pp.494-50, Nov 2017.

Singh, A.K., Sabelkin, V., and Mall, S., "Creep-rupture behaviour of notched oxide/oxide ceramic matrix composite in combustion environment." *Journal of Advances in Applied Ceramics*, Vol. 117, Issue 1, pp. 30-41, 2018.

Singh, A.K., Misak, H., and Mall, S., "Effect of UVB Light Exposure on Tensile Behavior of Carbon Nanotube Sheet." *Journal of Nanoscience and Nanotechnology*, Vol. 18, Number 3, pp. 2079-2084, Mar 2018.

Singh, A.K., and Mall, S., "Tensile and fatigue behavior of oxide/oxide ceramic matrix composite with simulated foreign object damage in combustion environment." *Journal of Applied Ceramic Technology*, Vol. 15, Issue 1, pp. 16-27, Jan/Feb 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Azad, A.I., Dargazany, R., Mirzaeifar, R., and Mall, S., "A Multi-Scale Model for Bending Stiffness of CNT Strands in CNT Fibers." Paper No. IMECE2017-72713, Proceedings of the ASME 2017 International Mechanical Engineering Congress and Exposition, Nov 2017.

O'HARA, RYAN P., Maj,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2015 (AFIT/ENY); BS, Mechanical Engineering, US Air Force Academy, 2000; MS, Aeronautical Engineering, Wright State University, 2005; PhD, Aeronautical Engineering, Air Force Institute of Technology, 2012. Maj O'Hara's research focuses on the application of mechanical structures and structural dynamics. Areas of interest include turbine engines, laminate composites, small UAS, and additive manufacturing. AFIT research center affiliation(s): CSRA. Tel. 937-255-6565 x4542, email: <mailto:Ryan.OHara@afit.edu>

SPONSOR FUNDED RESEARCH PROJECTS

"Optimized, Integrated, and Additively Manufactured CubeSat Structural Bus." Sponsor: Undisclosed. Funding: \$81,875 – O'Hara 50%, Hartsfield 50%. [CSRA]

"Material Characterization of CNT Textiles." Sponsor: Undisclosed. Funding: \$105,885 – O'Hara 50%, Hartsfield 50%.

"Critical Process Parameters, Fault Detection, and Damping of AM Components for App. to Turbine Engines." Sponsor: AFRL/RQ. Funding: \$70,000.

“Evaluation of Hardening Concepts in a Surrogate UAV Wing Section with Composite Skin Coupons.” Sponsor: AFRL/RX. Funding: \$50,000 – O’Hara 51%, Herr 49%.

“Empirical Optimization of Additive Manufacturing.” Sponsor: NASA (UTC). Funding: \$70,000.

REFEREED JOURNAL PUBLICATIONS

Hope, D., Deluca, A., and O’Hara, R., “Investigation into Reynolds Number Effects on a Biomimetic Flapping Wing,” *International Journal of Micro Air Vehicles*, Volume 10, Issue 1, 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Scott-Emuakpor, O., and O’Hara, R., “Investigating Damping Performance of Laser Powder Bed Fused Components with Unique Internal Structures,” Turbo Expo 2018, GT2108-75977, 2018.

Cobb, G., Lingenfelter, A., Nesmith, A., and O’Hara, R., “Vibrational Properties of Additively Manufactured Inconel 718,” 56th AIAA Aerospace Sciences Meeting, AIAA 2018-0489, 2018. [CSRA]

PALAZOTTO, ANTHONY N.,

Distinguished Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 1975 (AFIT/ENY); BS, New York University, 1955; MS, Brooklyn Polytechnic Institute, 1961; PhD, New York University, 1968. Dr. Palazotto’s interests include nonlinear mechanics, shell analysis, finite elements, composite materials, viscoplasticity, and nonlinear dynamics. Dr. Palazotto is the co-author of a textbook, “The Nonlinear Analysis of Shell Structures,” published in 1992 by the AIAA. In addition he has authored 248 archival technical publications and more than 600 technical presentations and manuscripts. Dr. Palazotto received the Hetenyi Award in 1982 from the Society of Experimental Mechanics, the Cleary Award in 1981 from the Air Force Materials Lab, the Structures and Materials Award from the ASCE in 1986, and the AIAA Sustained Service Award in 2004. Dr. Palazotto is a Fellow of the ASCE, a Fellow of the AIAA, a Fellow of the American Academy of Mechanics, and a Fellow of the Engineering Mechanics Institute. He has advised over 180 MS theses, 35 Doctoral dissertations and 15 Post Docs. He is a registered Professional Engineer in the State of Ohio. Tel. 937-255-3636 x4599, email: Anthony.Palazotto@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“A Study of the Point-wise Effects of Laser Shock Peening.” Sponsor: AFRL/RQ. Funding: \$23,927.

“Predictive Model for Behavior of Bolted Composite/Metallic Laminate Joint.” Sponsor: AFRL/RQ. Funding: \$17,995.

“The Analysis of Small Lighter Than Air Vehicles.” Sponsor: AFOSR. Funding: \$46,727.

“Computational Analysis of Problems Containing Both Heat Transfer and Structural Vibration.” Sponsor: AFRL/RQ. Funding: \$25,000.

REFEREED JOURNAL PUBLICATIONS

Graves, W., Liu, D., and Palazotto, A., “Impact of an Additively Manufactured Projectile,” *Journal of Dynamic Behavior of Materials*, Vol. 3, pp. 362-376, 2017.

Abid, N., Abu Al-Rub, R., and Palazotto, A., “Micromechanical Finite Element Analysis of the Effects of Martensite Particle Size and Ferrite Grain Boundaries on the Overall Mechanical Behavior of Dual Phase Steel.” *ASME, Journal of Engineering Materials and Technology*, Vol. 139, 041006-1 to 041006-8, October, 2017.

Park, Y., Palazotto, A., Hale, C., and Jung, J., “Internal Longitudinal Damage Detection in a Steel Beam Using Lamb Waves: Simulation and Test Study,” *Journal of Intelligent Material Systems and Structures*, Vol. 29(3), pp. 411-422, 2018.

Provchy, Z., Palazotto, A., Flater, P., “Topology Optimization for Projectile Design,” *Journal of Dynamic Behavior of Materials*, Vol. 4, pp. 129-137, 2018.

Schwemmer, J., Palazotto, A., and Chrissis, J., “Optimal Design of a Hexakis Icosahedron Vacuum-Based- Lighter-than-Air Vehicle,” *AIAA Journal*, Vol. 56, No. 6, June, 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Song, R., Muliana, A., and Palazotto, A., “The Effects of Energy Dissipation on the Creep and Cyclic Responses of NARLOY-Z,” presented at the Intl. Mechanical Engineering Congress and Exposition, Tampa, FL, 2018, Paper IMECE 2017-70131.

Deleon, A, Palazotto, A., and Baker, W., “ Evaluation of Wear Damage During a High Speed Scenario,” presented at the 3rd Thermal and Fluid Engineering Conference, March 4-7, 2018, Fort Lauderdale, FL., paper 1830.

Engelbrechtsen, C., Palazotto, A., and Langer, K., “Strain Rate Dependent FEM of Laser Shock Induced Residual Stress,” presented at the Soc. of Experimental Mechanics, 2018 Annual Conference, Greenville, South Carolina, June 4-7, 2018, Paper 698.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Deleon, A., Baker, W., and Palazotto, A., “Evaluation of a Nonlinear Melt Region,” presented at AIAA SciTech 2018, Kissimmee, FL., AIAA-2018-0187, January 8-12, 2018.

Engelbrechtsen, C., Palazotto, A., and Langer, K., “Finite Element Model Correlation of Laser Shock Penning,” presented at AIAA SciTech 2018, Kissimmee, FL., AIAA-2018-0234, January 8-12, 2018.

Patel, A., and Palazotto, A., “Investigation of Hybrid Material Projectile Impact Against Concrete Targets,” presented at AIAA SciTech 2018, Kissimmee, FL., AIAA-2018-0236, January 8-12, 2018.

Schwemmer, J., Palazotto, A., and Chrissis, J., “Optimal Design of a Hexakis Icosahedron Vacuum Based Lighter than Air Vehicle,” presented at AIAA SciTech 2018, Kissimmee, FL., AIAA-2018- 1386, January 8-12, 2018.

Castello, A., and Palazotto, A., “Structural Analysis and Optimization of the Hexakis Lighter than Air Vehicle,” presented at AIAA SciTech 2018, Kissimmee, FL., AIAA-2018-1994, January 8-12, 2018.

Hoffman, J., and Palazotto, A., “Linear Modeling of an Electromechanical Actuator Test Rig,” presented at AIAA SciTech 2018, Kissimmee, FL., AIAA-2018-2158, January 8-12, 2018.

Lui, B., Palazotto, A., Vivek, G., and Doehn, G., “Impact Welding of Wrought and Additively Manufactured 15-5 PH Stainless Steel,” presented at AIAA SciTech 2018, Kissimmee, FL., AIAA-2018-0488, January 8-12, 2018.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Hoffman, J., Palazotto, A., Niedbalski, N., “Linear Modeling of an Electromechanical Actuator Test Rig,” Presented at the 10th Annual ASME Dayton Engineering Science Symposium, WSU, October, 2017.

Castello, A., and Palazotto, A., “In Depth Structural Analysis of the Hexakis Lighter than Air Vehicle,” Presented at the 10th Annual ASME Dayton Engineering Science Symposium, WSU, October, 2017.

Adorno, R., and Palazotto, A., “Potential of Lighter than Air Vehicles under a Vacuum,” Presented at the 10th Annual ASME Dayton Engineering Science Symposium, WSU, October, 2017.

- Patel, A., and Palazotto, A., "Investigation of Multi-material Projectile Impact," Presented at the 10th Annual ASME Dayton Engineering Science Symposium, WSU, October, 2017.
- Liu, B., Palazotto, A., and Doehn, G., "Impact Welding of Dissimilar Material Combinations of an Additive Manufactured Material," Presented at the 10th Annual ASME Dayton Engineering Science Symposium, WSU, October, 2017.
- Engelbrechtsen, C., Palazotto, A., and Langer, K., "Laser Shock Penning for Aircraft Life Extension," Presented at the 10th Annual ASME Dayton Engineering Science Symposium, WSU, October, 2017.
- Moore, K., and Palazotto, A., "Nonlinear Static Analysis of a Celestial Icosahedron Vacuum Lighter than Air Vehicle," Presented at the 10th Annual ASME Dayton Engineering Science Symposium, WSU, October, 2017.
- Deleon, A., Baker, W., and Palazotto, A., "Tracking a Nonlinear Melt Region Produced During a High Velocity Event," Presented at the 10th Annual ASME Dayton Engineering Science Symposium, WSU, October, 2017.
- Desroches, J., Palazotto, A., and Won, H., "Suppression of Vertex Induced Vibration," Presented at the 10th Annual ASME Dayton Engineering Science Symposium, WSU, October, 2017.
- Adorno, R., and Palazotto, A., "Progress of Lighter than Air Vehicles with an Internal Vacuum," presented at the 43rd Dayton-Cincinnati Aerospace Science Symposium, Sinclair Conference Center, Dayton, OH., February, 27, 2018.
- Hoffman, J., Palazotto, A., and Niedbalski, N., "Analysis of an Electromechanical Actuator Rig," presented at the 43rd Dayton-Cincinnati Aerospace Science Symposium, Sinclair Conference Center, Dayton, OH. February, 27, 2018.
- Moore, K., and Palazotto, A., "Static Nonlinear Analysis of a Complex Structure," presented at the 43rd Dayton-Cincinnati Aerospace Science Symposium, Sinclair Conference Center, Dayton, OH. February, 27, 2018.
- Liu, B., Palazotto, A., and Doehn, G., "Impact Welding for Rapped Repair of Heat Treated Components," presented at the 43rd Dayton-Cincinnati Aerospace Science Symposium, Sinclair Conference Center, Dayton, OH. February, 27, 2018.
- Castello, A., and Palazotto, A., "Hexakis Icosahedron Vacuum Lighter than Air Vehicle Structural Analysis of the Air Evacuation System," presented at the 43rd Dayton-Cincinnati Aerospace Science Symposium, Sinclair Conference Center, Dayton, OH. February, 27, 2018.
- Brewer, J., Palazotto, A., and Falugi, M., "Bearing Strength Optimization and Characterization of a Hybrid Composite Structure," presented at the 43rd Dayton-Cincinnati Aerospace Science Symposium, Sinclair Conference Center, Dayton, OH. February, 27, 2018.
- Deleon, A., Palazotto, A., and Baker, W., "Investigating the Nonlinear Melt Region Produced within a High Speed Environment," presented at the 43rd Dayton-Cincinnati Aerospace Science Symposium, Sinclair Conference Center, Dayton, OH. February, 27, 2018.
- Desroches, J., Palazotto, A., and Won, H., "Suppression of Vertex Induced Vibration for a Elliptic Cross-Sections through Thermal Effects," presented at the 43rd Dayton-Cincinnati Aerospace Science Symposium, Sinclair Conference Center, Dayton, OH. February, 27, 2018.
- Engelbrechtsen, C., Palazotto, A., and Langer, K., " F. E. modeling of Laser Shot Pinning Stresses for Fatigue Improvement", presented at the 43rd Dayton-Cincinnati Aerospace Science Symposium, Sinclair Conference Center, Dayton, OH. February, 27, 2018.
- Adomo-Rodriguez, R., and Palazotto, A., "Instability of Axially Loaded Cylindrical Shells Induced by Material Nonlinearity," presented at the ASCE Engineering Mechanic Institute Conference, MIT, Boston, Mass., May, 29-June, 1, 2018.

Lui, B., Palazotto, A., and Zupta, V., “Interfacial Morphology of Impact Welding, Additive Manufactured 25-5 Stainless Steel,” presented at the ASCE Engineering Mechanics Institute Conference, MIT, Boston, Mass., May, 29-June, 1, 2018.

Lee, J., and Palazotto, A., “Evaluation of an Airfoil Considering Flapping Motion at Flutter Frequency,” presented at the ASCE Engineering Mechanics Institute Conference, MIT, Boston, Mass., May 29 - June 1, 2018.

POLANKA, MARC D.,

Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2009 (AFIT/ENY); BS, Mechanical Engineering, University of Dayton, 1992; MS, Mechanical Engineering, Stanford University, 1993; PhD, Mechanical Engineering, University of Texas, 1999. Prior to accepting a position with AFIT, Dr. Polanka served 17 years in Turbine Engine Division of the Air Force Research Laboratory’s Propulsion Directorate. His research interests include aspects of heat transfer, combustion, and fluid mechanics focusing on experimental applications involving turbine and combustor aerodynamics and cooling techniques. He has been published in a variety of journals including the AIAA Journal of Propulsion and Power, the ASME Journal of Turbomachinery and the Journal of Engineering for Gas Turbines and Power. Dr. Polanka also has two patents to his credit. He is an Associate Fellow of the AIAA, the past Section Chair of the Dayton-Cincinnati Section of the AIAA, and the Honors and Awards Chair for the same section. Dr. Polanka serves as the Chair of the AIAA Associate Fellows Selection Committee and is the Faculty representative for the AFIT Student Section branch of AIAA. He is also a Fellow of the ASME and serves as the Vice Chair of the K-14 Heat Transfer Committee of the International Gas Turbine Institute where he is also a past Point Contact for the annual Turbo Expo conference. Tel. 937-255-3636 x4714, email: Marc.Polanka@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“AFIT Combustion Laboratory Program Concerning UCC, RDE, Small Engines, and Secondary Reaction Combustion Phenomena.” Sponsor: AFRL/RQ. Funding: \$30,500 – Polanka 98%, Comer 2%.

“Combustion Physics under High Centripetal Acceleration.” Sponsor: AFOSR. Funding: \$65,157 – Polanka 85%, Rutledge 15%.

“Advanced Turbine Cooling.” Sponsor: OFRN (OSU). Funding: \$96,360.

REFEREED JOURNAL PUBLICATIONS

Andrus, I.Q., King, P.I., Polanka, M.D., Schauer, F.R., and Hoke, J.L., “Design of a Premixed Fuel-Oxidizer System to Prevent Flashback in a Rotating Detonation Engine,” *Journal of Propulsion and Power*. Vol. 33, No. 5, pp. 1063-1073, 2017. doi:10.2514/1.B36259.

Andrus, I.Q., Polanka, M.D., King, P.I., Schauer, F.R., and Hoke, J.L., “Experimentation of a Premixed Rotating Detonation Engine Utilizing a Variable Slot Feed Plenum,” *Journal of Propulsion and Power*. Vol. 33, No. 6, pp. 1448-1458. doi:10.2514/1.B36261.

Shepard, J.J., Polanka, M.D., Naples, A.G., Hoke, J.L., Kaemming, T.A., Schauer, F.R., “Development and Testing of a Rotating Detonation Engine Fueled With JP-8,” *JANNAF Journal of Propulsion and Energetics*, Vol. 8, No. 1, 2017, pp. 13-26.

Cottle, A.E., Polanka, M.D., Goss, L.P., Goss, C.Z., “Investigation of Air Injection and Cavity Size Within a Circumferential Combustor to Increase G-Load and Residence Time,” *ASME. Journal of Engineering for Gas Turbines Power*. 2017; 140(1): 011501-011501-12. doi:10.1115/1.4037578.

Wiese, C.J., Rutledge, J.L., Polanka, M.D., “Experimental Evaluation of Thermal and Mass Transfer Techniques to Measure Adiabatic Effectiveness with Various Coolant to Freestream Property Ratios,” *Journal of Turbomachinery*, Vol. 140(2), pp. 021001 1:9, Feb 2018. doi: 10.1115/1.4038177.

Blantin, J.R., Ausserer, J.K., Polanka, M.D., Litke, P.J., and Baranski, J.R., "Energy Balance and Power Loss Pathway Study of a 120 cc Four-Stroke Internal Combustion Engine," *Journal of Engineering for Gas Turbines and Power*. vol. 140 (7), pp. 072803 1-10, July 2018.

Ausserer, J.K., Polanka, M.D., Litke, P.J., and Baranski, J.R., "Engine-Control Impact on Energy Balances for Two-Stroke Engines for 10-25 kg Remotely-Piloted Aircraft," *Journal of Engineering for Gas Turbines and Power*. vol. 140 (11), pp. 112803 1-18, 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Wiese, C.J., Bryant, C.E., Rutledge, J.L., Polanka, M.D., "Influence of Scaling Parameters and Gas Properties on Overall Effectiveness on a Leading Edge Showerhead," ASME Turbo Expo, GT-2018-75332, Oslo, Norway, June 11-15, 2018.

Bryant, C.E., Wiese, C.J., Rutledge, J.L., Polanka, M.D., "Experimental Evaluations of the Relative Contributions to Overall Effectiveness in Turbine Blade Leading Edge Cooling," ASME Turbo Expo, GT-2018-75334, Oslo, Norway, June 11-15, 2018.

Bohan, B.T., and Polanka, M.D., A New Spin on Small-Scale Combustor Geometry," ASME Turbo Expo, GT2018-75338, Oslo, Norway, June 11-15, 2018.

DeMarco, K.J., Bohan, B.T., Polanka, M.D., Rutledge, J.L., Akbari, P.J., "Computational Analysis of an Additively Manufactured Cooled Ultra Compact Combustor Vane," ASME Turbo Expo, GT2018-75392, Oslo, Norway, June 11-15, 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Bohan, B.T., and Polanka, M.D., and Larry P. Goss. "Measurements of Temperature, Pressure, Velocity, and Frequency in an Ultra Compact Combustor," 2018 AIAA Aerospace Sciences Meeting, AIAA SciTech Forum, AIAA 2018-1875, Jan 8-12, 2018, doi:10.2514/6.2018-1875.

DeMarco, K.J., Bohan, B.T., Hornedo Rodriguez, E.A., Polanka, M.D., and Goss, L.P., "Design Strategy for Fuel Introduction to a Circumferential Combustion Cavity," 2018 AIAA Aerospace Sciences Meeting, AIAA SciTech Forum, AIAA 2018-1876, Jan 8-12, 2018, doi:10.2514/6.2018-1876.

Meyer, S.J., Polanka, M.D., Schauer, F.R., and Hoke, J.L., "Parameter Impact on Heat Flux in a Rotating Detonation Engine," 2018 AIAA Aerospace Sciences Meeting, AIAA SciTech Forum, AIAA 2018-0400, Jan 8-12, 2018, doi:10.2514/6.2018-0400.

Huff, R., Polanka, M.D., McClearn, M.J., Schauer, F.R., Fotia, M. and Hoke, J.L. "A Disk Rotating Detonation Engine Part 1: Design and Buildup," 2018 AIAA Aerospace Sciences Meeting, AIAA SciTech Forum, AIAA 2018-0633, Jan 8-12, 2018, doi:10.2514/6.2018-0633.

McClearn, M.J., Schauer, F.R., Huff, R., Polanka, M.D., Hoke, J.L. and Fotia, M., "A Disk Rotating Detonation Engine Part 2: Operation," 2018 AIAA Aerospace Sciences Meeting, AIAA SciTech Forum, AIAA 2018-1607, Jan 8-12, 2018, doi:10.2514/6.2018-1607.

DeMarco, K.J., Bohan, B.T., and Polanka, M.D., Goss, L.P., "Performance Characterization of a Circumferential Combustion Cavity," 54th AIAA/SAE/ASME Joint Propulsion Conference, AIAA Propulsion and Energy Forum, AIAA 2018-4922, July 9-11, 2018.

Huff, R., Polanka, M.D., McClearn, M.J., Schauer, F.R., Fotia, M. and Hoke, J.L., "A Radial Rotating Detonation Engine Driven Bleed Air Turbine," 54th AIAA/SAE/ASME Joint Propulsion Conference, AIAA Propulsion and Energy Forum, AIAA 2018-4879, July 9-11, 2018.

Akbari, P.J., and Polanka, M.D., “Performance of an Ultra-Compact Disk-Shaped Reheat Gas Turbine for Power Generation,” 54th AIAA/SAE/ASEE Joint Propulsion Conference, AIAA Propulsion and Energy Forum, AIAA 2018-4878, July 9-11, 2018.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Associate Editor for ASME Journal of Engineering for Gas Turbines and Power.

PATENT APPLICATIONS

Pickl, C.W., Rutledge, J.L., Polanka, M.D., Harkless, C., Crabtree, M., Filed 31 Jan 2018, “Reverse Wake-Minimizing Wind Tunnel Wake Generator,” Application No. 15/884865.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

AF Outstanding Scientist/Engineer for 2017, Senior Civilian – AFIT/EN Nominee

AFIT Nominee for Educator of the Year

Appointed to be Chair of the AIAA Associate Fellows Committee

Elected to be the Vice-Chair of the ASME IGTI Heat Transfer Committee

Best Paper Award Winner for ASME IGTI Heat Transfer

Beasley, B.A., Polanka, M.D., Reinhart, J.T., Baranski, J.A., “Characterization and Scaling Study of a Pressure Wave Supercharger,” 43DCASS-085, Sinclair Community College, Dayton, OH, 27 Feb, 2018.

Tewaheftewa, J.T., Polanka, M.D., Rutledge, J.L., Bryant, C.E., “Investigation of Geometric and Thermal Scaling Effects on a Simulated Turbine Leading Edge Model,” 43DCASS-086, Sinclair Community College, Dayton, OH, 27 Feb, 2018.

Huff, R., Polanka, M.D., McClearn, M.J., Schauer, F.R., Fotia, M. and Hoke, J.L. “A Disk Rotating Detonation Engine Driven Auxiliary Power Unit,” 43DCASS-087, Sinclair Community College, Dayton, OH, 27 Feb, 2018.

Bohan, B.T., Polanka, M.D., “Fluidic Oscillators Injecting into Backward-Facing Steps” 43DCASS-088, Sinclair Community College, Dayton, OH, 27 Feb, 2018.

DeMarco, K.J., Polanka, M.D., Bohan, B.T., Rutledge, J.L., “Computational Analysis of an Additively Manufactured Cooled Ultra Compact Combustor Vane,” 43DCASS-091, Sinclair Community College, Dayton, OH, 27 Feb, 2018.

Meyer, S.J., Polanka, M.D., Schauer, F.R., Hoke, J. L. “Parameter Impact on Heat Flux in a Rotating Detonation Engine,” 43DCASS-097, Sinclair Community College, Dayton, OH, 27 Feb, 2018.

Fischer, J.P., Rutledge, J.L., Polanka, M.D., “Scaling Low Temperature Adiabatic Effectiveness Results Using Various Flow Rate Parameters,” 43DCASS-111, Sinclair Community College, Dayton, OH, 27 Feb, 2018.

Polanka, M.D., “Reactive Cooling,” Invited Seminar, Pratt and Whitney, East Hartford, Conn, 5 Jun, 2018.

REEDER, MARK F.,

Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2002 (AFIT/ENY); BS, Mechanical Engineering, West Virginia University, 1989; MS, Mechanical Engineering, The Ohio State University, 1991; PhD, Mechanical Engineering, The Ohio State University, 1994. Prior to accepting a position with AFIT, Dr. Reeder served as an NRC Research Associate at NASA Glenn and subsequently as the manager of Research and Development for a manufacturer of industrial mixing equipment. His research interests include all aspects of fluid mechanics with an emphasis on experimental applications involving external aerodynamics, mixing

enhancement, and propulsion. Publications include characterizations of store separation from a cavity using pressure sensitive paint and measurements relating to several types of aircraft using 6-DOF balances, particle image velocimetry, filtered Rayleigh scattering, and other diagnostic tools. Dr. Reeder has also recently published in the area of low temperature ablation in a supersonic flow as applied to thermal management systems for space access vehicles. He has been published in a variety of journals including Experiments in Fluids, Journal of Fluid Mechanics, The AIAA Journal, The AIAA Journal of Propulsion and Power, AIAA Journal of Aircraft, the AIAA Journal of Spacecraft and Rockets, Physics of Fluids, NASA Tech Briefs, the AIChE Journal, and Chemical Engineering Progress. Dr. Reeder also has four patents to his credit, is a licensed Professional Engineer in the State of Ohio, and is an elected member of the Academy of Distinguished Alumni, Department of Mechanical and Aerospace Engineering, West Virginia University. He currently serves on the editorial board of the International Journal of Micro Air Vehicles. Dr. Reeder is an Associate Fellow of the AIAA and a member of ASME. Tel. 937-255-3636 x4530, email: Mark.Reeder@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Measurements and Analysis of Wall Effects on Rotating Engine Components.” Sponsor: AFRL/RQ. Funding: \$30,000.

“Drop Testing in the AFIT Small Supersonic Tunnel with Ejection Mechanism.” Sponsor: AFRL/RQ. Funding: \$30,000 – Reeder 80%, Crowe 20%.

“Hypersonic Aerodynamic Studies using AFRL Facilities.” Sponsor: AFRL/RQ. Funding: \$15,000 – Reeder 50%, Komives 50%.

“Missile Development Concepts and Solutions.” Sponsor: Lockheed Martin. Funding: \$80,000 – Reeder 40%, Miller 40%, Crowe 20%.

REFEREED JOURNAL PUBLICATIONS

Reeder, M.F., Hoskins, C., Sherer, S., Hagen, B., “Analysis of Mach 3 Flow Over a Hemispherical Pylon,” *Journal of Defense Research and Engineering*, Vol. 1, Issue 2, August 2018, Article 1058483 (18 pages).

Lingenfelter, A.J., Liu, D., Reeder, M.F., Brickson, E.T., “Synchronized Imagery Assessment of Hydrodynamic Ram Cavity Features to Transient Spray,” *Journal of Visualization and Image Processing*, Vol. 23, No. 3, October 2016, pp. 171-192.¹

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Hoskins, C., Reeder, M.F., Sherer, S., and Hagen, B., “Analysis of Mach 3 Flow over a Hemispherical Pylon” JANNAF 48th Combustion Conference, 4-7 December 2017, Newport News, VA.

Semmelmayr, F., Reeder, M.F., Seymour, R., “Statistical Characteristics of the Influence of an Electronically Scanned Pressure Transducer on Measurement Error and Uncertainty,” AIAA 2018-4111, AIAA Aviation Conference 2018, 25-29 June 2018.

Chin, D., Granlund, K., Maatz, I., Schmit, R., Reeder, M.F., “Stochastic Store Trajectory of Ice Models with Forced Ejection from a Cavity into Supersonic Flow,” AIAA 2018-3549, AIAA Aviation Conference 2018, 25-29 June 2018.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Serves on the editorial board of the International Journal of Micro Air Vehicles

¹ Not previously reported.

RUGGLES-WRENN, MARINA B.,

Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2003 (AFIT/ENY); BS, Polytechnic Institute of New York, 1981; MS, Rensselaer Polytechnic Institute, 1983; PhD, Rensselaer Polytechnic Institute, 1987. Dr. Ruggles-Wrenn's interests center on mechanics of materials and structures, including experimental investigation of material behavior in extreme environments, advanced structural materials, high-temperature structural design methods, and viscoplasticity. She has published over 140 peer reviewed scientific publications. Dr. Ruggles-Wrenn received several research and best paper awards; Stinson Trophy of the National Aeronautic Association, Col Gage H. Crocker Outstanding Professor Award, as well as the AFIT Instructor of the Quarter Award. Prior to joining AFIT, she was a research scientist at the Oak Ridge National Laboratory (1987-2003). Dr. Ruggles-Wrenn is a member of the Editorial Board of Applied Composite Materials and an Associate Technical Editor of the ASME Journal of Pressure Vessel Technology. She is a Fellow of the American Society of Mechanical Engineers (ASME) and a member of the American Ceramic Society. Dr. Ruggles-Wrenn is the Chair of the ASME Pressure Vessels and Piping Division. Tel. 937-255-3636 x4641, email: Marina.Ruggles-Wrenn@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Static Fatigue of SiC Fiber in Air and Si(OH)₄ Saturated Steam." Sponsor: AFRL/RX. Funding: \$10,000.

"Characterization of Creep Behavior of an EBC Coated SiC/SiC CMC in Air and in Steam Environment." Sponsor: AFRL/RX. Funding: \$20,000.

"Mechanical Properties and Fatigue Behavior of Hybrid Laminates for More Efficient Bearing Strength." Sponsor: AFRL/RQ. Funding: \$24,997.

"Creep Deformation and Durability of Ultra High Temperature Ceramics in Extreme Environments." Sponsor: AFOSR. Funding: \$55,000.

REFEREED JOURNAL PUBLICATIONS

Ruggles-Wrenn, M.B., Minor, S.N., Przybyla, C.P., and Jones, E.L., "Creep of a Nextel™720/alumina ceramic composite containing an array of small holes at 1200°C in air and in steam," *International Journal of Applied Ceramic Technology*, 2018;00:1–11., |<https://doi.org/10.1111/ijac.13074>.

Ruggles-Wrenn, M.B., Boucher, N.J., and Przybyla, C.P., "Fatigue of three advanced SiC/SiC ceramic matrix composites at 1200°C in air and in steam," *International Journal of Applied Ceramic Technology*, Vol. 15, 2018, pp. 3-15.

Ruggles-Wrenn, M.B., and Lee, M.D., "Fatigue behavior of an advanced SiC/SiC ceramic composite at 1300°C in air and in steam," *Ceramic Transactions*, Vol. 263, 2017, pp. 231-242.

Wilkinson, M.P., and Ruggles-Wrenn, M.B., "Fatigue of 2D and 3D carbon-fiber-reinforced polymer matrix composites at elevated temperature," *Applied Composite Materials*, Vol. 24, 2017, pp. 1405–1424.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Ruggles-Wrenn, M.B., Boucher, N.J., and Przybyla, C.P., "Fatigue of advanced SiC/SiC ceramic matrix composites at elevated temperature in air and in steam In Silicic Acid-Saturated Steam," GT2018-75051, Proceedings of ASME Turbo Expo 2018, Oslo, Norway, June 11-15, 2018.

Boucher, N.J., and Ruggles-Wrenn, M.B., "Fatigue of advanced melt-infiltrated ceramic matrix composites at elevated temperature," Proceedings of the 42nd International Conference & Exposition on Advanced Ceramics & Composites, Daytona Beach FL, January 21-26, 2018.

Ruggles-Wrenn, M.B., “Mechanical properties and fatigue behavior of CMCs for aerospace engine applications: effects of temperature and environment,” IMECE2017-70131, Proceedings of the ASME 2017 International Mechanical Engineering Congress and Exposition IMECE 2017, Tampa FL, November 3-9, 2017.

Ruggles-Wrenn, M.B., “Mechanical Behavior of CVI and MI SiC/SiC Ceramic Matrix Composite at Elevated Temperature in Air and in Steam,” Proceedings of the MS&T’17, Materials Science & Technology 2017 Conference and Exhibition, Pittsburgh PA, October 8-12, 2017.

Ruggles-Wrenn, M.B., “Mechanical performance of oxide/oxide composites in extreme environments: degradation and failure mechanisms,” Proceedings of the 15th Conference and Exhibition of the European Ceramic Society (ECerS 2017), Budapest, Hungary, July 9-13, 2017.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editorial Board Member, Applied Composite Materials – International Journal for the Science and Application of composite Materials

Associate Technical Editor, ASME Journal of Pressure Vessel Technology

RUTLEDGE, JAMES L., Lt Col,

Associate Professor of Aerospace Engineering; Department of Aeronautics and Astronautics, AFIT Appointment Date: 2011 (AFIT/ENY); BS, Mechanical Engineering, University of Texas at Austin, 2002; MS, Mechanical Engineering, University of Texas at Austin, 2004; PhD, Aeronautical Engineering, Air Force Institute of Technology, 2009. Lt Col Rutledge’s research interests include experimental and computational investigations of gas turbine heat transfer, unsteady fluid mechanics, inverse heat transfer and aerothermodynamics. He holds a patent, has published over 20 archival journal articles and was awarded the Rohsenow Prize in 2008 by ASME and an ASME Best Paper award in 2017. Lt Col Rutledge is a member of the ASME K-14 Gas Turbine Heat Transfer Committee, ASME, AIAA, and Tau Beta Pi. He is a registered professional engineer in the State of Texas and has deployed to Afghanistan in support of Operation Enduring Freedom. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4734, email: James.Rutledge@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Film Cooling Scaling and Wake Effects.” Sponsor: AFRL/RQ. Funding: \$19,893.

REFEREED JOURNAL PUBLICATIONS

Bills, J.D., Crowe, D.S., Rutledge, J.L., Coy, E.B., 2018, “Modeling Fuel Film Cooling on a Flat Plate,” *Journal of Thermophysics and Heat Transfer*, Vol. 32, No. 3, July-September, pp. 736-746.

Wiese, C.J., Rutledge, J.L., Polanka, M.D., 2018, “Experimental Evaluation of Thermal and Mass Transfer Techniques to Measure Adiabatic Effectiveness with Various Coolant to Freestream Property Ratios,” *Journal of Turbomachinery*, Vol. 140, No. 2, February, pp. 021001-1 – 021001-9.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Rutledge, J.L., Baker, W.P., 2018, “Unsteady Effects on the Experimental Determination of Overall Effectiveness,” ASME Turbo Expo 2018, Paper No. GT2018-75846.

DeMarco, K.J., Bohan, B.T., Polanka, M.D., Rutledge, J.L., Akbari, P., 2018, “Computational Analysis of an Additively Manufactured Cooled Ultra Compact Combustor Vane,” ASME Turbo Expo 2018, Paper No. GT2018-75392.

Bryant, C.E., Wiese, C.J., Rutledge, J.L., Polanka, M.D., 2018, “Experimental Evaluations of the Relative Contributions to Overall Effectiveness in Turbine Blade Leading Edge Cooling,” ASME Turbo Expo 2018, Paper No. GT2018-75334.

Wiese, C.J., Bryant, C.E., Rutledge, J.L., Polanka, M.D., 2018, "Influence of Scaling Parameters and Gas Properties on Overall Effectiveness on a Leading Edge Showerhead," ASME Turbo Expo 2018, Paper No. GT2018-75332.

PATENT APPLICATIONS

Pickl, C.W., Rutledge, J.L., Polanka, M.D., Harkless, C., Crabtree, M., Filed 31 Jan 2018, "Reverse Wake-Minimizing Wind Tunnel Wake Generator," Application No. 15/884865.

THOMAS, LEVI M., Maj,

Associate Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2017 (AFIT/ENY); BS, Aeronautical Engineering, United States Air Force Academy, 2006; MS, Aeronautical Engineering Air Force Institute of Technology, 2009; AA, Foreign Language, Defense Language Institute, 2011; PhD, Mechanical Engineering, Purdue University, 2017. Maj Thomas deployed to Iraq in 2018 in support of Operation Inherent Resolve. Research interests include laser measurement techniques and combustion. He has experience as an intelligence analyst (air-to-air weapons), as a combustion research engineer (detonation combustion), and as an exchange officer working with the German Aerospace Center (combustion physics). Previous research includes detonation measurements as well as laser-based velocity and temperature measurements. Professional memberships include AIAA, ASME, and the Combustion Institute, and Maj Thomas is a registered professional engineer in the state of Colorado. Tel. 937-255-3636 x4500, email: Levi.Thomas@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"RDE Characterization using Laser Absorption Spectroscopy & Computational Fluid Dynamics." Sponsor: AFRL/RQ. Funding: \$10,000.

REFEREED JOURNAL PUBLICATIONS

Lowe, A., Thomas, L.M., Satija, A., Lucht, R.P., and Masri, A.R., "Chirped-probe-pulse femtosecond CARS thermometry in turbulent spray flames," *Proceedings of the Combustion Institute*, 2018, <https://doi.org/10.1016/j.proci.2018.06.149>.

Thomas L.M., Satija A., and Lucht R.P. "Technique developments and performance analysis of chirped-probe-pulse femtosecond coherent anti-Stokes Raman scattering combustion thermometry," *Applied Optics*, Vol. 56, Issue 31, pp 8797-8810, 2017. <https://doi.org/10.1364/AO.56.008797>.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Thomas L.M., Lowe A., Satija A., Masri A., and Lucht R.P., "High Repetition-Rate Thermometry in a Piloted Spray Burner using Femtosecond Chirped-Probe-Pulse Coherent Anti-Stokes Raman Scattering," 2018 AIAA Aerospace Sciences Meeting, AIAA SciTech Forum, (AIAA 2018-1423), <https://doi.org/10.2514/6.2018-1423>.

TORVIK, PETER J.,

Professor Emeritus of Aerospace Engineering and Engineering Mechanics, Department of Aeronautics and Astronautics, (AFIT/ENY); BS, University of Minnesota, 1960; MS, University of Minnesota, 1962; PhD, University of Minnesota, 1965; BA, Wright State University, 1980. Dr. Torvik is a specialist in theory of elasticity, wave propagation, shock and vibration, impact damage in aircraft systems, laser-material interactions, and aircraft survivability/vulnerability. His primary research interests include structural dynamics, specifically damping, impact, and penetration mechanics. Dr. Torvik is the author of over 100 technical papers and reports and some 30 other publications. He served as Head of the Department of Aeronautics and Astronautics, 1980-1990. Dr. Torvik is the recipient of the AF Meritorious Civilian Service Award, the AF Exceptional Civilian Service Award, the Outstanding Civilian Career Service Award, USAF, and the John Leland Atwood Award and Medal, AIAA and ASEE. He is a Fellow of AIAA, a Fellow of the ASME, and a Fellow of Ohio Academy of Science.

WALKER, MICHAEL M., Lt Col,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2018 (AFIT/ENY); BS, Aeronautical & Astronautical Engineering, United States Air Force Academy, 2003; MS,

Aeronautical Engineering, Air Force Institute of Technology, 2007; MBA, Management, Amberton University, 2007; PhD, Aeronautical Engineering, The Ohio State University, 2018. Lt Col Walker's research interests include aerodynamics, swept-wing performance, active flow control, and experimental and computational fluid mechanics. He is a developmental engineer with experience at the Air Force Research Laboratory (AFRL), Hanscom AFB; the National Air and Space Intelligence Center (NASIC), Wright-Patterson AFB; the Launch and Range Systems Directorate (LRS), Los Angeles AFB; and deployed to Kandahar Airfield, Afghanistan in support of Operation Enduring Freedom. Lt Col Walker is a member of Sigma Gamma Tau and AIAA. Tel. 937-255-3636 x4745, email: Michael.Walker@afit.edu

REFEREED JOURNAL PUBLICATIONS

Walker, M.M., Hipp, K.D., Benton, S.I., and Bons, J.P., "Effect of Jet Spacing on Swept-Wing Leading-Edge Separation Control," *AIAA Journal*, July 2018, Vol. 56: 2907-2910, DOI: 10.2514/1.J056352.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Walker, M.M., and Bons, J.P., "The Effect of Passive and Active Boundary-Layer Fences on Swept-Wing Performance at Low Reynolds Number," 2018 AIAA Aerospace Sciences Meeting, January 2018. DOI: 10.2514/6.2018-0793.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Walker, M.M., "Replicating the Effects of a Passive Boundary-Layer Fence via Active Flow Control," PhD Dissertation, The Ohio State University, March 2018.

WIESEL, WILLIAM E., Jr.,

Professor of Aeronautical Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 1977 (AFIT/ENY); BS, University of Massachusetts, 1970; MS, Harvard University, 1972; PhD, Harvard University, 1974. Dr. Wiesel's research interests include applications of dynamical systems theory to orbital mechanics and astrodynamics, especially KAM theory; estimation and control, planetary astronomy, stability theory, and optimal control. He is the author of *Spaceflight Dynamics*, a leading introductory text on aeronautical engineering. Dr. Wiesel has authored over 50 technical papers and has been a member of the department for 40 years. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4312, email: William.Wiesel@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"AFIT Orbit Determination Algorithms for Modeling, Simulation and Analysis with HPC." Sponsor: AFRL/RV. Funding: \$37,500. [CSRA]

REFEREED JOURNAL PUBLICATIONS

W. E. Wiesel, "A KAM Tori Algorithm for Earth Satellite Orbits," *Journal of the Astronautical Sciences*, Vol. 65, pp. 46–62, 2018. <https://doi.org/10.1007/s40295-017-0123-7>. [CSRA]

Rich, A.T., Stuart, K.J., and Wiesel, W.E., "Stochastic Dynamics of and Collision Prediction for Low Altitude Earth Satellites," *Journal of the Astronautical Sciences*, <https://doi.org/10.1007/s40295-018-0129-9>. Published Online 12 June 2018. [CSRA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Wiesel, W.E., "Action-Angle Variables Near Degenerate Periodic Orbits," AAS 18-205, Presented at the 2018 AAS/AIAA Astrodynamics Specialist Conference, Snowbird, UT. August 2018. [CSRA]

5.2. DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

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5.2.1	<u>DOCTORAL DISSERTATIONS</u>	70
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5.2.1. DOCTORAL DISSERTATIONS

BECKER, DAVID J., *Techniques for Improved Space Object Detection Performance from Ground-Based Telescope Systems Using Long and Short Exposure Images*. AFIT/ENG/DS/18S-006. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: AFOSR.

CASEY, DANIEL J., *Progressive Network Deployment, Performance, and Control with Software-Defined Networking*. AFIT/ENG/DS/18M-017. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A. [CCR]

CURRO, JOSEPH A., *Navigation with Artificial Neural Networks*. AFIT/ENG/DS/18S-007. Faculty Advisor: Dr. John F. Raquet. Sponsor: N/A. [ANT]

DILL, RICHARD, *Automating Mobile Device File Format Analysis*. AFIT/ENG/DS/18S-008. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: N/A. [CCR]

HEFRON, RYAN G., *Breaking down the barriers to operator workload estimation: Advancing algorithmic handling of temporal non-stationarity and cross-participant differences for EEG analysis using deep learning*. AFIT/ENG/DS/18S-012. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: N/A. [CCR]

KNISELY, ALEXANDER G., *Non-Destructive Characterization of Rotated Uniaxial Anisotropic Materials*. AFIT/ENG/DS/18S-013. Faculty Advisor: Dr. Michael J. Havrilla. Sponsor: AFRL.

OKOLICA, JAMES S., *Temporal Event Abstraction and Reconstruction*. AFIT/ENG/DS/17D-004. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: N/A.

ROSADO GARCIA, CARLOS X., *Effects of Temporal Coherence on Target Based Phasing of Fiber Laser Arrays*. AFIT/ENG/DS/18M-056. Faculty Advisor: Maj Milo W. Hyde. Sponsor: AFRL/RD.

WEBBER, FREDERICK C., *Multi-Objective Reinforcement Learning with Concept Drift*. AFIT/ENG/DS/17D-006. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: 711 HPW/RH. [ANT]

5.2.2. MASTER'S THESES

- ALOMBRO, MATTHEW N., Small Arms Weapon Orientation and Position Estimation through Scenario-Based Simulations. AFIT/ENG/MS/18M-006. Faculty Advisor: Maj Scott J. Pierce. Sponsor: ARL HRED. [ANT]
- ANDERSON, ROGER S., Defender-Assisted Evasion and Pursuit Maneuvers. AFIT/ENG/MS/18M-007. Faculty Advisor: Dr. Meir Pachter. Sponsor: AFOSR. [ANT]
- BALL, NATHAN R., Effects of Dynamic Goals on Agent Performance AFIT/ENG/MS/18J-003. Faculty Advisor: Maj Jason M. Bindewald Sponsor: N/A.
- BENTJEN, KARL C., Mitigating the Effects of Cyber Attacks and Human Control in an Autonomous Intersection. AFIT/ENG/MS/18M-008. Faculty Advisor: Dr. Scott R. Graham. Sponsor: AFRL/RV. [CCR]
- BEYER, STEVEN M., Pattern-of-Life Modeling Using Data Leakage in Smart Homes. AFIT/ENG/MS/18M-009. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A. [CCR]
- BODIN, TAYLOR B., Behavior Flexibility for Autonomous Unmanned Aerial Systems. AFIT/ENG/MS/18M-011. Faculty Advisor: Maj Jason M. Bindewald. Sponsor: N/A. [ANT]
- BOLTON, SARAH J., Cognitive Effects of Short Duration Short Wavelength Visible Light. AFIT/ENG/MS/18M-012. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: 711 HPW/USAFSAM.
- BORNEMAN, MARKUS M., Estimating Defensive Cyber Operator Decision Confidence. AFIT/ENG/MS/18M-013. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: 711 HPW/RH. [CCR]
- BRADFORD-WINKLER, LUKE M., Variable Speed Simulation for Accelerated Industrial Control System Cyber Training. AFIT/ENG/MS/18M-014. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]
- BREAU, TREVOR A., Radar Analog Versus Digital LFM Waveform Discrimination Using The Data Collection Pod Receiver. AFIT/ENG/MS/17D-028. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/RV.
- BROYLES, DANIEL J., Non-GNSS Smartphone Pedestrian Navigation Using Barometric Elevation and Digital Map-Matching. AFIT/ENG/MS/18M-015. Faculty Advisor: Dr. John F. Raquet Sponsor: AFRL/RI. [ANT]
- BRUZA, MASON R., An Analysis of Multi-Domain Command and Control and the Development of Software Solutions through DevOps Toolsets and Practices. AFIT/ENG/MS/18M-016. Faculty Advisor: Lt Col Mark G. Reith. Sponsor: N/A. [CCR]
- CARRASCO, SALOME E., Efficient Phase Retrieval for Off-Axis Point Spread Functions AFIT/ENG/MS/18J-084. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: N/A.
- CELEBUCKI, DANIEL J., Methods of Reverse Engineering a Bitstream for Field Programmable Gate Array Protection. AFIT/ENG/MS/18M-018. Faculty Advisor: Dr. Scott R. Graham. Sponsor: AFRL/RV. [CCR]
- CONNORS, JACOB W., Assessing the Competing Characteristics of Privacy and Safety within Vehicular Ad Hoc Networks. AFIT/ENG/MS/18M-019. Faculty Advisor: Dr. Scott R. Graham. Sponsor: N/A. [CCR]
- DUCHANE, ALEXANDER W., Modeling a Space-Based Quantum Link. AFIT/ENG/MS/18M-020. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: Laboratory for Telecommunications Sciences.
- DUNN, MICHAEL H., Assessing and Expanding Extracurricular Cybersecurity Youth Activities' Impact on Career Interest. AFIT/ENG/MS/18M-021. Faculty Advisor: Dr. Laurence D. Merkle. Sponsor: AFRL. [CCR]
- ELLIS, JOSEPH A., Low-Profile Vertically Polarized End-Fire Radiating Antennas for V-Band Applications. AFIT/ENG/MS/18M-024. Faculty Advisor: Dr. Peter J. Collins Sponsor: AFRL/RV.

ELLIOTT, KOLBY H., Evaluation of Resiliency in a Wide-Area Backup Protection System via Model Checking. AFIT/ENG/MS/18M-023. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: N/A. [CCR]

ERVIN, RODERICK D., Detecting YARD Stick One Rogue Attacks on Insteon Home Automation Devices Using a Low Cost Software Defined Radio (SDR). AFIT/ENG/MS/18M-025. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/RV. [CCR]

FROBERG, BRANDON P., Assured Android Execution Environments. AFIT/ENG/MS/18M-027. Faculty Advisor: Dr. Laurence D. Merkle. Sponsor: AFRL/RI. [CCR]

GALLAGHER, ANTWON R., Radio Tomographic Imaging using a Modified Maximum Likelihood Estimator for Image Reconstruction in Various Environments. AFIT/ENG/MS/18M-028. Faculty Advisor: Dr. Richard K. Martin. Sponsor: N/A.

GOODBODY, IAN R., Applying Direct GPS Spectrum Sensing Anti-jamming Receiver Solutions. AFIT/ENG/MS/18M-029. Faculty Advisor: Dr. Sanjeev Gunawardena. Sponsor: 746 TS. [ANT/CCR]

GUION, JEFFREY J., Dynamic Cyber Mission Mapping. AFIT/ENG/MS/18M-030. Faculty Advisor: Lt Col Mark G. Reith. Sponsor: SAF/CIO. [CCR]

HART, DANIEL D., Techniques for Low-Latency in Software-Defined Radio-Based Networks. AFIT/ENG/MS/18M-032. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RV. [CCR]

JEFFRIES, BLAINE M., Securing Critical Infrastructure: A Ransomware Study. AFIT/ENG/MS/18M-034. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]

KANG, MIN W., An Exploration of Error-Correcting Codes for use in Noise-Prone Satellite Environments. AFIT/ENG/MS/18M-036. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RV.

KANNING, MATTHEW D., An Evaluation of the Cyberspace Modeling Capabilities of the Advanced Framework for Simulation, Integration and Modeling. AFIT/ENG/MS/18M-037. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: HQ AF/A9. [CCR]

KENNEDY, PATRICK R., Plasmonic Grating Geometries and Wavelength-Dependent Focus Depth in Infrared Detectors. AFIT/ENG/MS/18M-038. Faculty Advisor: Maj Tod Laurvick. Sponsor: AFRL/RV.

KOCH, DANIEL K., Dual Source Excitation Rectangular Waveguide Design and Evaluation for the Measurement of Electromagnetic Material Properties. AFIT/ENG/MS/18M-039. Faculty Advisor: Dr. Michael J. Havrilla. Sponsor: AFRL/RV.

LAW, BRADFORD E., Passive Radiolocation of IEEE 802/11 Emitters Using Directional Antennae. AFIT/ENG/MS/18M-040. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A. [CCR]

LEE, LAWRENCE J., Bandwidth Analysis of a Tightly-Packed Crossed-Dipole Array for Satellite Communications. AFIT/ENG/MS/18M-041. Faculty Advisor: Dr. Andrew J. Terzuoli. Sponsor: AFOSR. [CSRA]

LOIBL, ROBERT P., Target Detection using Convolutional Neural Networks. AFIT/ENG/MS/18M-043. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RV. [CTISR]

MALEC, MICHAEL P., Airborne Magnetic Anomaly Navigation Over Ocean Using Under Sampled Maps. AFIT/ENG/MS/18M-044. Faculty Advisor: Capt Aaron J. Canciani. Sponsor: ONR. [ANT]

MAYER, SAMUEL A., Quality of Service Impacts of a Moving Target Defense with Software-Defined Networking. AFIT/ENG/MS/18M-045. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A. [CCR]

MOORE, TYLER M., Special Perturbations on the Jetson TX1 and TX2 Computers. AFIT/ENG/MS/18M-047. Faculty Advisor: Col Dane F. Fuller. Sponsor: N/A. [CSRA]

MOUNT, LAUREN A., Navigation Using Vector and Tensor Measurements of the Earth's Magnetic Anomaly Field. AFIT/ENG/MS/18M-049. Faculty Advisor: Capt Aaron J. Canciani. Sponsor: ONR. [ANT]

NGUYEN, DUY K., Effects of Position Uncertainty on Passive Multistatic SAR Resolution Measures. AFIT/ENG/MS/18M-050. Faculty Advisor: Dr. Julie A. Jackson. Sponsor: N/A.

PAULSON, ZACHARY C., Mitigating the Effects of Boom Occlusion on Automated Aerial Refueling Through Shadow Volumes. AFIT/ENG/MS/18M-051. Faculty Advisor: Dr. Scott L. Nykl. Sponsor: AFRL/RQ. [ANT]

PENTECOST, SEELEY M., Demonstration of Signal Authentication and Dynamic Configuration Concepts for Next-Generation GPS Satellites. AFIT/ENG/MS/18M-052. Faculty Advisor: Dr. Sanjeev Gunawardena. Sponsor: AFRL/RV. [ANT]

PETERS, CHRISTIAN K., Discriminating Terrestrial Trunked Radio (TETRA) System Devices Using Distinct Native Attribute Fingerprinting. AFIT/ENG/MS/18M-053. Faculty Advisor: Maj Joan A. Betances Jorge. Sponsor: AFRL/RV. [CCR]

PHAN, TIFFANY M., RSS-based Device-free Passive Detection and Localization Using Home Automation Network Radio Frequencies. AFIT/ENG/MS/18M-054. Faculty Advisor: Dr. Richard K. Martin. Sponsor: N/A. [ANT/CCR]

ROEBER, JONATHAN B., Assessment of Structure from Motion for Reconnaissance Augmentation and Bandwidth Usage Reduction. AFIT/ENG/MS/18M-055. Faculty Advisor: Dr. Scott L. Nykl. Sponsor: N/A. [ANT]

SAMPLE, KENNETH R., Resolution Time Prediction From Air Force Network Trouble Ticket Data. AFIT/ENG/MS/18M-057. Faculty Advisor: Maj Alan C. Lin. Sponsor: N/A. [CCR]

SCHALKOPH, DANIEL J., Digital Forensics Event Graph Reconstruction. AFIT/ENG/MS/18M-058. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: DC3. [CCR]

SEYDEL, NICHOLAS J., Stereo Vision: A Comparison of Synthetic Imagery vs Real World Imagery for the Automated Aerial Refueling Problem. AFIT/ENG/MS/18M-059. Faculty Advisor: Dr. Scott L. Nykl. Sponsor: AFRL/RQ. [ANT]

SHELTERS, BERTUS A., Satellite Communications in the V and W Band: Tropospheric Effects. AFIT/ENG/MS/18M-060. Faculty Advisor: Dr. Andrew J. Terzuoli. Sponsor: AFRL/RI. [CSRA]

STUART, THOMAS R., Integrity Monitoring for Automated Aerial Refueling: A Stereo Vision Approach. AFIT/ENG/MS/18M-062. Faculty Advisor: Dr. Scott L. Nykl. Sponsor: AFRL/RQ. [ANT]

SWIHART, EVAN V., Expected Coverage (ExCov): A Proposal to Compute Fuzz Test Coverage within an Infinite Input Space. AFIT/ENG/MS/18M-063. Faculty Advisor: Maj Timothy J. Carbino. Sponsor: AFRL/RV. [CCR]

TOMPKINS, JOSEPH C., Near Earth Space Object Detection Utilizing Parallax as Multi-Hypothesis Test Criterion. AFIT/ENG/MS/18M-064. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: N/A.

WAGGONER, KULLEN W., Segmented Control of Electrostatically Actuated Bimorph Micromirrors. AFIT/ENG/MS/18M-065. Faculty Advisor: Capt Robert A. Lake. Sponsor: N/A.

WILLIS, JOHN M., MIL-STD-1553 Fingerprinting Using Existing Card Functionality. AFIT/ENG/MS/18M-068. Faculty Advisor: Dr. Robert F. Mills. Sponsor: AFRL/RV. [CCR]

WOLFE, CLARK L., Securing Data in Transit Using Two Channel Communication. AFIT/ENG/MS/18M-069.
Faculty Advisor: Dr. Scott R. Graham. Sponsor: N/A. [CCR]

YOON, YONGJUN, Mitigating Interference with Knowledge-Aided Subarray Pattern Synthesis and Space Time
Adaptive Processing AFIT/ENG/MS/18J-009. Faculty Advisor: Lt Col Phillip M. Corbell. Sponsor: N/A.

5.2.3. FACULTY BIOGRAPHIES & RESEARCH OUTPUT

Notes: Research Center affiliations are listed in [] if applicable. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

BETANCES, JOAN A., Maj,

Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2016 (AFIT/ENG); BSEE, Walla Walla University, 2003; MS, Air Force Institute of Technology, 2012; PhD, Electrical Engineering, Air Force Institute of Technology, 2016. Maj Betances' research interests include software-defined radios, cognitive radios, and wireless security. He is a member of Eta Kappa Nu and Tau Beta Pi honor societies. AFIT research center affiliation(s): ANT, CSRA, and CCR. Tel. 937-255-3636 x3305, email: Joan.Betancesjorge@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Ervin, Temple, Betances, "Detecting Insteon Home Automation Networks Attacks Using an SDR Radio Frequency Air Monitor," Proc of 13th Int'l Conf on Cyber Warfare and Security (ICCWS18), Washington D.C, Mar 2018.

BINDEWALD, JASON M., Maj,

Assistant Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2015 (AFIT/ENG); BA, Computer Science, Gettysburg College, 2005; MS, Cyber Operations, Air Force Institute of Technology, 2015; PhD, Computer Science, Air Force Institute of Technology, 2015. Maj Bindewald's research interests include human-machine teaming, machine learning, autonomous agents, and player modeling. He is a member of AAAI, HFES, and Tau Beta Pi engineering honorary society. AFIT research center affiliation(s): ANT and CCR.

SPONSOR FUNDED RESEARCH PROJECTS

"Cyber Operations and Behavior Modeling in AFSIM." Sponsor: AF/A9. Funding: \$179,220 – Bindewald 34%, Hodson 33%, Peterson 33%. [CCR]

"Measuring Human-Machine Trust Relationships." Sponsor: AFOSR. Funding: \$24,975. [ANT]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

King, D., J.M. Bindewald, and G. Peterson. "Informal Team Assignment in a Pursuit-Evasion Game." The 31st International Florida Artificial Intelligence Research Society Conference (FLAIRS-31). Melbourne, FL, May 2018. [ANT]

Ball, N., J.M. Bindewald, and G. Peterson. "On-line Agent Detection of Goal Changes." The 31st International Florida Artificial Intelligence Research Society Conference (FLAIRS-31). Melbourne, FL, May 2018. [ANT]

Hillesheim, A., C. Rusnock, and J.M. Bindewald. "Simulation of Human-Agent Team Performance in Reduced Reliability Environments." Industrial and Systems Engineering Research Conference (ISERC 2018). Orlando, FL, May 2018. [ANT]

Boubin, Jason G., Christina F. Rusnock, Jason M. Bindewald. "Quantifying Compliance and Reliance Trust Behaviors to Influence Trust in Human-Automation Teams." The Human Factors and Ergonomics Society International Annual Meeting (HFES 2017). Austin, TX, October 2017 [*Human Performance Modeling Best Student Paper Award*]. [ANT]

Garnick, Christopher J., Jason M. Bindewald, Christina F. Rusnock. "Designing an Automated Agent to Encourage Human Reliance." The Human Factors and Ergonomics Society International Annual Meeting (HFES 2017). Austin, TX, October 2017 [*System Development Technical Group (SDTG) David Meister Best Paper Award (#1/13)*]. [ANT]

Hillesheim, Anthony, Christina F. Rusnock, Michael E. Miller, Jason M. Bindewald. "Relationships between User Demographics and User Trust in an Autonomous Agent." The Human Factors and Ergonomics Society International Annual Meeting (HFES 2017). Austin, TX, October 2017. [ANT]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Bindewald, Jason M., Christina F. Rusnock, Michael E. Miller. "Measuring Human Trust Behavior in Human-Machine Teams." Applied Human Factors and Ergonomics (AHFE 2017). Los Angeles, CA, July 2017. [ANT]

BECKER, DAVID J., Maj,

Assistant Professor of Electric Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2018 (AFIT/ENG); BSEE, University of Maine Orono, 2006; MS, Air Force Institute of Technology, 2013; PhD, Electrical Engineering, Air Force Institute of Technology, 2018. Maj Becker's research interests include space object detection from electro-optical sensors and image processing. Tel. 937-255-3636 x4371, email:

David.Becker@afit.edu

REFEREED JOURNAL PUBLICATIONS

David Becker and Stephen Cain, "Improved space object detection using short-exposure image data with daylight background," Applied Optics 57, 3968-3975 (2018)

BORGHETTI, BRETT J.,

Associate Professor of Computer Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2008 (AFIT/ENG); BSEE, Worcester Polytechnic Institute, 1992; MSCS, Air Force Institute of Technology, 1996; PhD, Computer Science, University of Minnesota, 2006. Dr. Borghetti's research interests include machine learning, autonomous agents, and multi-agent systems. AFIT research center affiliation(s): ANT, CCR, COA, CTISR. Tel. 937-255-3636 x4612, email: Brett.Borghetti@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Modeling Decision Confidence to Improve Cyber Mission Effectiveness." Sponsor: 711 HPW. Funding: \$31,013. [CCR]

"Information Acquisition Deficit Detection and Mitigation through Neurophysiological-sensed Operator Patterns." Sponsor: AFOSR. Funding: \$41,818 – Borghetti 50%, Oxley 50%.

REFEREED JOURNAL PUBLICATIONS

Hefron, Ryan G., Borghetti, Brett J., Christensen, James C., Schubert Kabban, Christine M., Estep, Justin R., "Cross-Participant EEG-Based Assessment of Cognitive Workload Using Multi-Path Convolutional Recurrent Neural Networks," *Sensors (MDPI)*, Vol.18(5), 26 April 2018, Article Number 1339, pp.1-27. DOI:10.3390/s18051339. <http://www.mdpi.com/1424-8220/18/5/1339>

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Sample, Kenneth, Lin, Alan, C., Borghetti, Brett J., Peterson, Gilbert, L., "Predicting Trouble Ticket Resolution," *Proceedings of the 31st International Florida Artificial Intelligence Research Society Conference*, Melbourne, FL, 21-23 May 2018. [ANT/CCR]

Vieane, Alex, Funke, Gregory, Greenlee, Eric, Mancuso, Vincent, Borghetti, Brett J., Miller, Brent, Menke, Lauren, Brown, Rebecca, Foroughi, Cyrus, K., and Boehm-Davis, Deborah, "Task Interruptions Undermine Cyber Defense," *Proceedings of the 2017 Human Factors and Ergonomics Society International Conference*, Austin, TX, 9-13 October 2017 (Mark Resnick Best Paper Award Winner) [CCR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

McQuaid, Ian, Merkle, Laurence D., Borghetti, Brett J., Cobb, Richard, Fletcher, Justin “Space Object Identification Using Deep Neural Networks” *Advanced Maui Optical and Space Surveillance Technologies Conference (AMOS)*, Maui, HI, 11-14 September 2018.

Jackson, Bryan V., Miller, Michael E., Borghetti, Brett, J., “Invoking Steady-State Visual Potentials Through Near Infrared Signals,” *Institute of Industrial and Systems Engineers (IISE) Industrial Systems Engineering Research Conference (ISERC) 2018*.

BROWN, FRANK M.,

Professor Emeritus of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 1961 (AFIT/ENG); BS, MS, PhD, the Ohio State University. Dr. Brown’s research interests are discrete mathematics and operations research.

CAIN, STEPHEN C.,

Associate Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2003 (AFIT/ENG); BSEE, University of Notre Dame, 1992; MSEE, Michigan Technological University, 1994; PhD, University of Dayton, 2001. Dr. Cain’s research interests include electro-optics, remote sensing, and signal processing. Tel. 937-255-3636 x4716, email: Stephen.Cain@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Improved Resident Space Object Detection via Atmospheric Scintillation Effects.” Sponsor: AFOSR. Funding: \$43,233 – Cain 50%, Vitayaudom 50%.

“Non-Linear Photo-Detector Calibration without Calibrated Sources.” Sponsor: AFOSR. Funding: \$17,920.

“Solid State Batteries with Doped Silicon Electrolyte.” Sponsor: AFOSR. Funding: \$26,030.

REFEREED JOURNAL PUBLICATIONS

Nicholas J. Yielding, Stephen C. Cain, Michael D. Seal, “Statistical photocalibration of photodetectors for radiometry without calibrated light sources,” *Opt. Eng.* Vol. 57 No. (1) DOI:014107, 25 January 2018.

David Becker and Stephen C. Cain, “Improved space object detection using short-exposure image data with daylight background,” *Applied Optics*, Vol. 57, Issue 14, pp. 3968-3975, 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Stephen C. Cain, “Super Resolution Imaging via Expectation-Maximization Estimation of Near Stellar Neighborhoods,” SPIE Unconventional Imaging and Wavefront Sensing, San Diego, CA, August 2018.

CANCIANI, AARON J., Capt,

Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2015 (AFIT/ENG); BSEE, Air Force Academy, 2010; MSEE, Air Force Institute of Technology, 2012; PhD, Electrical Engineering, Air Force Institute of Technology, 2016. Capt Canciani’s research interests include GPS-alternative navigation systems using environmental signals, SLAM, deep learning, and vision navigation.. He is a member of The Institute of Navigation (ION). AFIT research center affiliation(s): ANT. Tel. 937-255-3636 x4618, email: Aaron.Canciani@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Magnetic Anomaly Navigation for Naval Platforms.” Sponsor: ONR. Funding: \$250,000. [ANT]

“Navigation for A2AD, Long Range, Over Water Ingress.” Sponsor: AFRL/RV. Funding: \$400,000 – Canciani 60%, Leishman 30%, Raquet 10%. [ANT]

“High Resolution Magnetic Mapping and Modeling.” Sponsor: NGA. Funding: \$500,000. [ANT]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Air Force John L. McLucas Basic Research Award – top Air Force award for basic research.

Organized and hosted DARPA Magnetic Navigation Summit with over 60 attendees from more than a dozen government agencies

CARBINO, TIMOTHY J., Maj,

Electrical Engineering Division Chief, Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2015 (AFIT/ENG); BSCE, University of Florida, 2006; MSEE, Air Force Institute of Technology, 2012; PhD, Electrical Engineering, Air Force Institute of Technology, 2015. Maj Carbinio’s research interests include critical infrastructure protection, computer communication networks, computer security, side channel analysis, reconfigurable computing systems, Radio Frequency Intelligence, and VLSI design. He is a member of the Eta Kappa Nu and IEEE. AFIT research center affiliation(s): ANT, CCR, and CSRA.

SPONSOR FUNDED RESEARCH PROJECTS

“Exploration of Estimative Algorithms for Improved Handling of Single Event Upsets.” Sponsor: Undisclosed. Funding: \$54,936 – Carbinio 75%, Petrosky 25%. [CCR/CSRA]

CASEY, DANIEL J., Maj,

Instructor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2016 (AFIT/ENG); BS, Computer Science, United States Air Force Academy, 2006; MS, Computer Science, Southern Methodist University, 2009. Maj Casey’s research interests include software defined networking and reverse engineering. He is a member of Tau Beta Pi Engineering Honor Society. AFIT research center affiliation(s): CCR. Tel 937-255-3636 x4613, email: Daniel.Casey@afit.edu

CHANDRAHALIM, HENGKY,

Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2017 (AFIT/ENG); BSC, The Ohio State University, 2000; MEng, Cornell University, 2004; MSc, Cornell University, 2008; PhD, Electrical and Computer Engineering, Cornell University, 2009. Dr. Chandrahaliim’s research interests include mutually enhancing electronic, phononic, and photonic multifunctional microsystems, fabrication techniques for novel integrated nanosystems, and molecular scale sensing. He is a member of the OSA and senior member of the IEEE. Tel. 937-255-3636 x4483, email: Hengky.Chandrahaliim@afit.edu

REFEREED JOURNAL PUBLICATIONS

Lei Wan, Hengky Chandrahaliim, Jian Zhou, Zhaohui Li, Cong Chen, Sangha Cho, Hui Zhang, Ting Mei, Huiping Tian, Yuji Oki, Naoya Nishimura, Xudong Fan, and Lingjie Jay Guo, “*Demonstration of versatile whispering-gallery micro-lasers for remote refractive index sensing*,” Opt. Express, 26, 2018, pp. 5800-5809.

Cong Chen, Lei Wan, Hengky Chandrahaliim, Jian Zhou, Hui Zhang, Sangha Cho, Ting Mei, Hiroaki Yoshioka, Huiping Tian, Naoya Nishimura, Xudong Fan, Lingjie Jay Guo, and Yuji Oki, “*Effects of edge inclination angles on whispering-gallery modes in printable wedgemicrodisk lasers*,” Opt. Express, 26, 2018, pp. 233-241.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Chandrahaliim, Hengky, “Micro-ring resonators for magneto-electric experimentation,” Foundations of Nonlinear Optics (FoNLO), Skidmore College, Saratoga Springs, New York, June 19-21, 2018.

Chandrahali, Hengky, "Sustainable whispering-gallery ring laser sensors," Emerging Technologies 2018 conference, Whistler, British Columbia, Canada, May 9-11, 2018

COLLINS, PETER J.,

Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2006 (AFIT/ENG); BA, Bethel College, MN, 1985; BSEE, University of Minnesota, 1985; MSEE, Air Force Institute of Technology, 1990; PhD, Air Force Institute of Technology, 1996. His research interests include low observables, computational electromagnetics, radar cross section metrology, remote sensing, and electromagnetic material design and analysis. He is a senior member of the IEEE. AFIT research center affiliation(s): ANT, CCR, and CSRA. Tel. 937-255-3636 x7256, email: Peter.Collins@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Enabling Technologies for Advanced Munitions." Sponsor: AFLCMC. Funding: \$100,000 – Collins 50%, Hartsfield 25%, Lingenfelter 25%.

"Enabling Technologies for Radar Scattering Measurements." Sponsor: AFRL/RV. Funding: \$134,216.

"Technical Support: RCS Metrology." Sponsor: 46 TG. Funding: \$40,000.

"Noise Radar CubeSat Design and Engineering Model." Sponsor: Undisclosed. Funding: \$150,000 – Collins 30%, Johnson 10%, Hartsfield 20%, Cobb 10%. [CSRA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Ellis, Joseph and Collins, Peter J., "Low-profile Endfire Radiating Wideband Antenna for Ka band Applications," The 39th Antenna Measurement Techniques Association Symposium, Atlanta, Georgia, 15-20 October 2017.

Knisely, Alexander. Havrilla, M., Hyde, M., Collins, Peter J., and William Baker "Rotated Uniaxial Anisotropic Material Characterization - Theory," The 39th Antenna Measurement Techniques Association Symposium, Atlanta, Georgia, 15-20 October 2017.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

P. Collins, "A Novel Quadrotor-based Field Probe Concept," 2017 RCS Measurement Facilities Technical Exchange Meeting, Las Cruces, NM, 16-18 April 2018. [ANT]

Collins, Peter J. "RCS 101 – The Art of the Invisible," (part of a half day design contest) The 39th Annual Meeting And Symposium of the Antenna Measurement Techniques Association (AMTA), Atlanta, Georgia, 17 October 2017.

CORBELL, PHILLIP M., Lt Col,

Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2014 (AFIT/ENG); BSEE, Southern Illinois University, 1998; MSEE, Air Force Institute of Technology, 2000; PhD, Air Force Institute of Technology, 2006. Lt Col Corbell's research interests include Electronic Warfare, Navigation Warfare, Waveform Diversity, Phased array, Adaptive, Cognitive, MIMO, multi-static MTI Radar architectures, Software Defined Radios and other disruptive technologies. He is a member of Tau Beta Pi, Eta Kappa Nu, Alpha Lambda Delta, and IEEE. AFIT research center affiliation(s): ANT and CSRA.

SPONSOR FUNDED RESEARCH PROJECTS

"GNSS Timing Testbed." Sponsor: Undisclosed. Funding: \$50,000. [ANT]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Robert Elliot Irby, Phillip Corbell, “On the Use of Machine Learning to Detect DRFMs: Sensitivity and Time-Variance Analysis,” 2018 Tri-Service Radar Conference, Monterey, CA, June 25-29 2018. [ANT]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Lt Col Phillip Corbell, “Cognitive EW amongst Liars; Mapping the EW/AI Minefield,” 1st Cognitive Radar & EW Workshop, GTRI Conference Center, 13-14 December 2018. [ANT]

Lt Col Phillip Corbell, “Cognitive EW in a Minefield of Lies: A Tale of Necessity and Prudence,” 2018 AOC Kittyhawk Week, ATIC, Dayton, OH, 12-14 June 2018. [ANT]

COUTU, RONALD, A., Jr.,

Adjunct Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2008 (AFIT/ENG); BSEE, University of Massachusetts, Amherst, 1993; MSEE, California Polytechnic (CalPoly) State University, San Luis Obispo, 1995; PhD, Air Force Institute of Technology, 2004. Dr. Coutu’s research interests include microelectronics, microelectromechanical systems (MEMS) and MEMS fabrication with emphasis on micro electrical contacts, phase change materials, tunable metamaterials and terahertz components. His areas of expertise include design, fabrication, and test of micro/nano devices. He is a member of Tau Beta Pi, Eta Kappa Nu, SEM, SPIE, MRS, and a Senior Member of the IEEE.

CURRO, JOSEPH A., Capt,

Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2018 (AFIT/ENG); BSEE, Clarkson University, 2010; MSEE, Air Force Institute of Technology, 2012; PhD, Electrical Engineering, Air Force Institute of Technology, 2018. Capt Curro’s research interests include GPS-alternative navigation systems using environmental signals. Interests also include using machine learning and neural networks for alternative navigation. He is a member of The Institute of Navigation (ION). AFIT research center affiliation(s): ANT. Tel. 937-255-3636 x4620, email: Joseph.Curro@afit.edu

DAVIS, NATHANIEL J., IV,

Professor Emeritus, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2005 (AFIT/ENG); BSEE, Virginia Polytechnic Institute and State University, 1976; MSEE, Virginia Polytechnic Institute and State University, 1977; PhD, Purdue University, 1985. Dr. Davis’ research interests include computer communications networks, cyber operations, and large scale computer architectures. He is a senior member of the IEEE and a member of the Sigma Xi, Eta Kappa Nu, and Tau Beta Pi honorary societies.

DEYOUNG, MARK, E., Lt Col,

Assistant Professor of Computer Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2018 (AFIT/ENG); BS, Columbia College, 2003; MS, Air Force Institute of Technology, 2008; PhD, Computer Engineering, Virginia Tech, 2018. Lt Col DeYoung’s research interests include hardware/software co design, embedded systems, cyber situational awareness, computational statistics, software engineering, and reverse engineering. He is a member of Eta Kappa Nu and Upsilon Pi Epsilon honor societies. AFIT research center Affiliation: CCR. Tel. 937-255-3636 x3368, email: Mark.DeYoung@afit.edu

GRAHAM, SCOTT R.,

Associate Professor of Computer Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2015 (AFIT/ENG); BS, Electrical Engineering, Brigham Young University, 1993; MS, Electrical Engineering, Air Force Institute of Technology, 1999; PhD, Electrical Engineering, University of Illinois at Urbana-Champaign, 2004. Dr. Graham’s research interests include the intersection between real physical systems and the computers that control them. Specific areas of interest include trusted avionics and vehicular computer systems. AFIT research center affiliation(s): CCR. Tel. 937-255-3636 x4581, email: Scott.Graham@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Platform Nxt Security Services.” Sponsor: AFRL/Ry. Funding: \$33,000. [CCR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Beyer, S.M., Mullins, B.E., Graham, S.R., Bindewald, J.M., “Pattern-of-Life Modeling Using Data Leakage in Smart Homes,” *SCI-300 Specialists’ Meeting (SM) on ‘Cyber Physical Security of Defense Systems’*, Fort Walton Beach, FL (USA) 8-9 May 2018 [CCR]

Willis, J.M., Mills, R.F., Mailloux, L.O., Graham, S.R., “MIL-STD-1553 Device Characterization using Organic Interface Functionality,” *SCI-300 Specialists’ Meeting (SM) on ‘Cyber Physical Security of Defense Systems’*, Fort Walton Beach, FL (USA) 8-9 May 2018

Jeffries, B.M., Mullins, B.E., Graham, S.R., “Securing Critical Infrastructure: A Ransomware Study,” *International Conference of Critical Infrastructure Protection*, Mar 2018 [CCR]

Celebucki, D.J., Graham, S.R., Gunawardena, S., “Reversing a Lattice ECP3 FPGA for Bitstream Protection,” *International Conference of Critical Infrastructure Protection*, Mar 2018 [CCR]

Bentjen, K.C., Graham, S.R., Nykl, S.L., “Introducing Persistent Human Control into a Reservation-Based Autonomous Intersection Protocol,” *International Conference of Critical Infrastructure Protection*, Mar 2018 [CCR]

Wolfe, C.L., Graham, S.R., Mills, R.F., Nykl, S.L., Simon, P.E., “Securing Data-in-Transit for Power-Limited Sensor Networks using Two-Channel Communication,” *International Conference of Critical Infrastructure Protection*, Mar 2018 [CCR]

Wolfe, C.L., Graham, S.R., Simon, P.E. “Securing Data in Transit using Tunable Two Channel Communication,” 13th *International Conference on Cyber Warfare and Security (ICWS 2018)*, Mar 2018 [CCR]

Connors, J.W., Graham, S.R., Mailloux, L.O., “Security Implications of V2V in an Autonomous Intersection Environment,” 13th *International Conference on Cyber Warfare and Security (ICWS 2018)*, Mar 2018 [CCR]

Bentjen, K.C., Graham, S.R., Nykl, S.L. “Modeling Misbehavior in Automated Vehicle Intersections in a Synthetic Environment,” 13th *International Conference on Cyber Warfare and Security (ICWS 2018)*, Mar 2018 [CCR]

Celebucki, D.J., Lin, A.C., Graham, S.R., “A Security Evaluation of Popular Internet of Things Protocols for Manufacturers,” 2018 *IEEE International Conference on Consumer Electronics (ICCE)*, Jan 2018 [CCR]

PATENT APPLICATIONS

Reber, P.E., Graham, S.R., Sweeney, P.J., Stephensen, M.M., “Active Attestation of Embedded systems,” Provisional application number 62635204. Filed 26 Feb 18 . [CCR]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Graham, S.R., “Attacks and Defenses on Cyber Physical Systems,” Guest Lecture for CEG 4424/6424 – Security Attacks & Defenses, Wright State University, Fairborn, OH, 10 Apr 2018.

GUNAWARDENA, SANJEEV,

Research Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2014 (AFIT/ENG); BSEE & BS, Engineering Physics, Ohio University, 1997; MSEE, Ohio University, 2000; PhD, Ohio University, 2007. Dr. Gunawardena’s research interests include satellite navigation and timing (SatNav), navigation warfare, software defined radio, reconfigurable computing, and domain-specific programmable ASICs. He is a member of the US Institute of Navigation. AFIT research center affiliation(s): ANT, CCR, and CSRA. Tel. 937-255-3636 x4659, email: Sanjeev.Gunawardena@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“GNSS Testbed Development.” Sponsor: AFRL/RV. Funding: \$200,000. [ANT]

“GPS Waveform Prototyping Platform (GWPP).” Sponsor: AFRL/RV. Funding: \$300,000 – Gunawardena 90%, Raquet 10%. [ANT]

REFEREED JOURNAL PUBLICATIONS

J. Curran, M. Arizabaleta, T. Pany, S. Gunawardena, “The Institute of Navigation’s GNSS SDR Metadata Standard,” Inside GNSS, November/December 2017. <http://insidegnss.com/wp-content/uploads/2018/01/novdec17-STANDARDS.pdf>. [ANT]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

S. Pentecost, S. Gunawardena, “Dynamic Power Allocation with Constant Envelope Transmission for Next Generation Software Defined GPS Payloads,” International Technical Meeting of the Institute of Navigation, Jan 29 - Feb 1 2018, Reston VA. <https://www.ion.org/publications/abstract.cfm?articleID=15560>. [ANT]

P. Patel, S. Gunawardena, R. K. Martin, “Characterization of Phase and Amplitude Quantization Effects in a Direct Digital Synthesis-based Waveform Generator for Future Software-Defined GPS Payloads,” International Technical Meeting of the Institute of Navigation, Jan 29 - Feb 1 2018, Reston VA. <https://www.ion.org/publications/abstract.cfm?articleID=15559>. [ANT]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Celebucki, D.J., Graham, S.R., Gunawardena, S., “Reversing a Lattice ECP3 FPGA for Bitstream Protection,” International Conference of Critical Infrastructure Protection, Mar 2018.

P. Patel, N. Raquet, S. Gunawardena, J. Hinks, J. Guerrero, “Demonstration of Distortionless Flex-Power and the Effects of a Chimera-Enabled GPS Authentication Signal on Current-Generation COTS Civilian GNSS Receivers,” 2018 Joint Navigation Conference, Long Beach, CA, July 2018. [ANT]

J. Egan, M. A. Temple, S. Gunawardena, “Discriminating GPS Signal Emulation Hardware,” 2018 Joint Navigation Conference, Long Beach, CA, July 2018. [ANT]

T. Pany, M. Arizabaleta, S. Gunawardena, J. Curran, A. Rügamer, “ION Software-Defined Radio Metadata Standard Report: September 2018,” 31st International Technical Meeting of the Institute of Navigation: ION GNSS+ 2018, Miami FL, September 2018. [ANT]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

S. Gunawardena, “Hands-on Introduction to GNSS Software Receivers and Signal Processing” 31st International Technical Meeting of the Institute of Navigation: ION GNSS+ 2018, September 2018, Miami, FL (Invited tutorial). [ANT]

P. Patel, S. Gunawardena, “GNSS Waveform Prototyping Platform (GWPP) for Advanced Signals Research,” 12th Annual Information Meeting of the Consortium of Ohio Universities on Navigation and Timekeeping (COUNT), April 3-4 2018, Columbus Ohio

HARTRUM, THOMAS C.,

Associate Professor Emeritus of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 1977 (AFIT/ENG); BEE, The Ohio State University, 1969; MS, The Ohio State University, 1969; PhD, The Ohio State University, 1973; MBA, Wright State University, 1979. Dr. Hartrum’s field of expertise is software engineering.

HAVRILLA, MICHAEL J.,

Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2002 (AFIT/ENG); BS, Michigan State University, 1987; MSEE, Michigan State University, 1989; PhD, Michigan State University, 2001. Dr. Havrilla's research interests include electromagnetic theory, guided wave theory and applications, electromagnetics of complex media, material characterization, low observables, electromagnetic scattering, and antenna theory. He is a member of HKN and Sigma Xi, senior member of the IEEE, and a Full Member of the International Union of Radio Science-Commission B. Tel. 937-255-3636 x4582, email: Michael.Havrilla@afit.edu

REFEREED JOURNAL PUBLICATIONS

- S. Karuppuswami, E. Rothwell, P. Chahal and M. Havrilla, "A triaxial applicator for the measurement of the electromagnetic property of materials," *Sensors*, DOI: 10.3390/s18020383, Vol. 18, No. 1, pp. 1-15, January 2018.
- J. Tang, A. Tayebi, B. Crowgey, E. Rothwell, B. Shanker, L. Kempel and M. Havrilla, "Characterization of Y-Bias Ferrite Materials for Tunable Antenna Applications Using a Partially-Filled Rectangular Waveguide," *Transactions On Antennas and Propagation*, Vol. 65, No. 10, pp. 5279-5288, October 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

- Knisely, M. Havrilla, M. Hyde, P. Collins and W. Baker, "Rotated Uniaxial Anisotropic Material Characterization – Theory," *Antenna Measurement Techniques Association Conference Proceedings*, pp. 361-365, Atlanta, Georgia, October 2017.
- Knisely, M. Havrilla, M. Hyde, P. Collins and W. Baker, "Rotated Uniaxial Anisotropic Material Characterization – Experiment," *Antenna Measurement Techniques Association Conference Proceedings*, pp. 366-371, Atlanta, Georgia, October 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

- M. Havrilla, "Rotated Uniaxial Parallel-Plate Waveguide Green Function Using a Scalar Potential Formulation," *Progress in Electromagnetics Research Symposium (PIERS)*, pp. TBD, Toyama, Japan, August 2018, Invited.
- M. Havrilla, "Bianisotropic Scalar Potential Formulation with Biased Graphene Layer, URSI National Radio Science Meeting, pp. 19, Boulder, Colorado, January 2018.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

- M. Havrilla, "Rotated Uniaxial Parallel-Plate Waveguide Green Function Using a Scalar Potential Formulation, *Progress in Electromagnetics Research Symposium (PIERS)*, pp. TBD, Toyama, Japan, August 2018, Invited.
- M. Havrilla, "Bianisotropic Scalar Potential Formulation with Biased Graphene Layer, URSI National Radio Science Meeting, pp. 19, Boulder, Colorado, January 2018, Invited.

HODSON, DOUGLAS D.,

Associate Professor of Software Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2011 (AFIT/ENG); BS, Physics, Wright State University, 1985; MS, Electro-Optics, University of Dayton, 1987; MBA, University of Dayton, 1999; PhD, Computer Engineering, Air Force Institute of Technology, 2009. Dr. Hudson's research interests include real-time distributed simulation architectures for training, test and analysis, networks, design patterns for modeling radar, and infrared effects. His research interests also include the modeling and simulation of Quantum Key Distribution protocols. AFIT research center affiliation(s): ANT, CCR, COA, and CSRA. Tel. 937-255-3636 x4719, email: Douglas.Hodson@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“AFSIM Maturation and Capability Improvements.” Sponsor: AFRL/RQ. Funding: \$35,096 – Hodson 50%, Peterson 50%. [ANT/CCR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

D.D. Hodson and J.R. Millar, “Application of ECS Game Pattern in Military Simulators,” the 16th International Conference on Scientific Computing, Jul 2018.

D.D. Hodson and D.P. Gehl, “The Mixed Reality Simulation Platform (MIXR),” the 16th International Conference on Scientific Computing, Jul 2018.

J.R. Millar and D.D. Hodson, “Modeling Inconsistency in DVEs with DEVS,” the 16th International Conference on Scientific Computing, Jul 2018.

D.D. Hodson and J.R. Millar, “Considering the Usefulness of Game Patterns and Concepts in the Domain of Interactive Military-Oriented Simulators,” Defense Analysis Exchange (DAE) XIX, May 2018.

J.R. Millar and D.D. Hodson, “Towards a Formal Definition of Plausibility in Real-Time Distributed Interactive Simulations,” Defense Analysis Exchange (DAE) XIX, May 2018.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Associate Editor, Journal of Defense Modeling and Simulation

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Session Chair and Associate Editor, “Military and Defense Modeling and Simulation,” 2018 International Conference on Scientific Computing (CSC18), Las Vegas, NV, Jul 30 – Aug 02, 2018.

Military Keynote Speaker, Winter Simulation Conference, Dec 2017.

Winter Simulation Conference: session chair, involved in paper selection/review.

Exchange conference. Air Force Representative/Session Chair for Defense Analysis Exchange (DAE) XIX, a Joint US/ROK military

HOPKINS, F. KENNETH.

Adjunct Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2018 (AFIT/ENG), BS, Northern Kentucky University, 1975; MS (EE), University of Cincinnati, 1979; MS (Physics), University of Cincinnati, 1980; PhD, Electrical Engineering, University of Cincinnati, 1983; Completed Air War College, Air University, 2008. Dr. Hopkins’ research interests include photonic devices, infrared detectors, and infrared laser sources. Tel. 937-255-3636 x4711, email: Frank.Hopkins@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Silicon Photonics for Fiber Lasers.” Sponsor: AFRL/RX. Funding: \$10,000.

REFEREED JOURNAL PUBLICATIONS

F.K. Hopkins, N.G. Usechak, H.J. Kim, X. Wang, H. Trada, K.M. Walsh, “A Novel Photodiode Array for Characterizing Optical Fibers,” *Applied Optics* **57** (2018) 409-413

J. Wei, J.M. Murray, F.K. Hopkins, D.M. Krein, K.T. Zawilski, P.G. Schunemann, and S. Guha, "Measurement of Refractive Indices of CdSiP₂ at Temperatures from 90 to 450 K," *Optical Materials Express* 8 (2018), 235-244

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

C.M. Liebig, F.K. Hopkins, S. Guha, K.L. Averett, K.T. Zawilski, P.G. Schunemann, E.M. Scherrer, N.C. Giles, L.E. Halliburton, "Status of CdSiP₂ development for scaling mid-infrared laser power," SPIE Proc. 10637 (2018)

B.J. Cole, L. Goldberg, S. Chinn, K.T. Zawilski, L.A. Pomeranz, J.C. McCarthy, F.K. Hopkins, P.G. Schunemann, (2018). "High efficiency compact mid-IR sources," SPIE Proc. 10511 (2018)

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Hopkins, F.K., Invited 4-Hour Short Course, "Infrared Countermeasures" at Directed Energy Professional Society Conference, 24 Sep 2018 in Portsmouth, VA

Hopkins, F.K, Co-lead on 3-year renewal of AFOSR grant, "Kilowatt class bandgap and Raman Fiber Lasers for High Atmospheric Transmission and Mid-IR Pump Applications"

HOPKINSON, KENNETH M.,

Interim Department Head, Professor, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2004 (AFIT/ENG); BSCS, Rensselaer Polytechnic Institute, 1997; MSCS, Cornell University, 2002; PhD, Cornell University, 2004. Dr. Hopkinson research interests include wired and wireless networking, fault tolerant and reliable distributed systems, middleware, operating systems, net-centric warfare, network security, cloud computing, machine learning applied to remote sensing, and the use of networks to enhance critical infrastructures. Dr. Hopkinson is a Senior Member of the IEEE, a Senior Member of the ACM, and a member of the Upsilon Pi Epsilon, and the Eta Kappa Nu honorary societies. AFIT research center affiliation(s): ANT, CCR, CSRA, and CTISR. Tel. 937-255-3636 x4579, email: Kenneth.Hopkinson@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Enhancing Satellite Security." Sponsor: Undisclosed. Funding: \$45,000.

"Using Cognitive Radios to Enhance Communications Capabilities." Sponsor: Undisclosed. Funding: \$45,000.

"Sensor Data Fusion for Improved Target Detection." Sponsor: AFRL/RV. Funding: \$22,000 – Hopkinson 50%, Steward 50%. [CSRA/CTISR]

"Cognitive and Mobile Networks." Sponsor: AFRL/RI. Funding: \$30,000.

SPONSOR FUNDED EDUCATIONAL PROJECTS

"Technical Support: Autonomy / Robotics Workshop." Sponsor: AFRL/RV. Funding: \$30,000.

REFEREED JOURNAL PUBLICATIONS

Hamman, S.T., Hopkinson, K.M., Fadul, J.E., A Model Checking Approach to Characterizing the Fault Tolerance of Smart Grid Protection Systems, *IEEE Transactions on Power Delivery*, Volume 32, Issue 6, December 2017, pp. 2408-2415.

Bodnar, T., Dering, M.L., Tucker, C., Hopkinson, K.M., Use Large Scale Social Media Networks as a Scalable Sensing System for Modeling Real Time Energy Utilization Patterns, *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, Volume 47, Issue 10, October 2017, pp. 2627-2640.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Mivule, K., Hopkinson, K.M., Distortion Search – A Web Search Privacy Heuristic,” *IEEE Future Technologies Conference*, 29-30 November 2017, Vancouver, Canada, Paper 239, pp. 1-11.

Dering, M., Lee, C., Hopkinson, K.M., Tucker, C.S., Mining Big Media Data Streams Generated Within Social Media Networks for Discovering Object-Energy Correlations, Proceedings of the ASME 2018 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE 2018), 26-29 August 2018, Quebec City, Quebec, Canada, pp. 1-11.

PATENTS AWARDED

Clark, M., Hopkinson, K.M., Transferable Multiparty Computation, Patent Application # 14/708,532 – 11 May 2015. Provides a method for multiparty computation where computational shares can be transferred to secondary parties based on a trigger event in a way that preserves privacy/security while simultaneously distributing the computational workload to aid in scalability. Patent Awarded November 7, 2017, Patent No. 9,813,234. Market Acceptance: TBD.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Hopkinson, K., Overcoming Communication, Distributed Systems, Simulation, and Security Challenges: A Case Study Involving the Protection and Control of the Electric Power Grid, Michigan Technological University Institute of Computing and Cybersystems (ICC) Distinguished Lecturer Seminar, Houghton, MI, USA, 20 April 2018.

HOUPIS, CONSTANTINE H.,

Professor Emeritus of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT
Appointment Date: 1952 (AFIT/ENG); BS, University of Illinois, 1947; MS, University of Illinois, 1948; PhD, University of Wyoming, 1971. Dr. Houpis’ research interests include guidance and control of aerospace vehicles, application of optimal control theory to engineering systems, flight control systems, digital control systems, computational and numerical methods for control systems design, linear and nonlinear control theory, multivariable theory, and quantitative feedback theory. Dr. Houpis has published numerous technical articles and textbooks. He is a registered professional engineer and a Fellow of the IEEE.

JACKSON, JULIE A.,

Associate Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT
Appointment Date: 2009 (AFIT/ENG); BS, Electrical Engineering, Wright State University, 2002; MS, Electrical Engineering, The Ohio State University, 2004; PhD, Electrical Engineering, The Ohio State University 2009. Dr. Jackson’s research interests include electromagnetic and statistical modeling, radar imaging algorithms, and radar signal exploitation. She is a member of IEEE, Eta Kappa Nu, and Tau Beta Pi. AFIT research center affiliation(s): CTISR. Tel. 937-255-3636 x4678, email: Julie.Jackson@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Dynamic Multi-static Radar Mission Planning.” Sponsor: AFRL/RV. Funding: \$50,000 – Jackson 50%, Lievsay 50%. [CTISR]

“Signal Detection in Linearly Mixed Observations with Background Replacement.” Sponsor: AFOSR. Funding: \$34,748.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

D. Nguyen and J. A. Jackson, “Effects of Position Uncertainty on Multistatic SAR Resolution Measures” IEEE Radar Conference, Oklahoma City, OK, Apr 2018, paper ID 4330, pp. 1-6.

J. A. Jackson and F. Lee-Elkin, “Polarimetric SAR Compressive Sensing Examples,” IEEE Radar Conference, Oklahoma City, OK, Apr 2018, paper ID 4250, pp. 1-6.

J. A. Jackson, "Parametric Models for Signature Prediction and Feature Extraction," 2018 International Applied Computational Electromagnetics Society (ACES) Symposium, Denver, CO, Mar 24-29, 2018, pp. 1-2.

PATENTS APPLICATIONS

J. A. Jackson and F. Lee-Elkin, "Method for Recovering Full Polarization Radar Data from a Subset of Polarization Channel Measurements," Provisional patent application number 62633928, filed 22 Feb 2018.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

J. A. Jackson, "Radar Scattering Phenomenology and Prediction Models," invited talk at Mathematical and Computational Aspects of Radar Imaging Workshop, The Institute for Computational and Experimental Research in Mathematics (ICERM) Brown University, Oct 16-20, 2017.

J. A. Jackson, "Parametric Models for Signature Prediction and Feature Extraction," 2018 International Applied Computational Electromagnetics Society (ACES) Symposium, Denver, CO, Mar 24-29, 2018, pp. 1-2.

J. A. Jackson, "Signal Propagation, Modeling, and Phenomenology for Monostatic, Bistatic, and Multi-static Radar Systems," Tutorial Short Course at IEEE Radar Conference, Oklahoma City, OK, April 2018.

LAKE, ROBERT A. Capt,

Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment date: 2015 (AFIT/ENG); BE, Wentworth Institute of Technology, 1999; BSEE, University of Massachusetts at Lowell, 2008; MSEE, Air Force Institute of Technology, 2010; PhD, Electrical Engineering, Air Force Institute of Technology, 2014. Capt Lake's research interests include microelectronics, MEMS, microfabrication, MEMS buckled membranes, and bistable compliant mechanisms.

LAMONT, GARY B.,

Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 1970 (AFIT/ENG); Bachelor of Physics, University of Minnesota, 1961; MSEE, University of Minnesota, 1967; PhD, University of Minnesota, 1970. Dr. Lamont teaches courses in computer science and computer engineering. His research interests include: evolutionary computation, artificial immune systems, intrusion and anomaly detection, information security, parallel and distributed computation, combinatorial optimization problems (single objective and multi-objective), software engineering, digital signal processing, and intelligent and distributed control. He has advised many MS and PhD students in these disciplines. Dr. Lamont has authored several textbooks (Multi-Objective EAs, Computer Control), various book chapters, as well as numerous papers. Dr. Lamont was also an engineering systems analyst for the Honeywell Aerospace Division for six years. He is a member of IEEE (senior member) ACM, ASEE, SIAM, Tau Beta Pi, and Eta Kappa Nu. Tel. 937-255-3636 x4718, email: Gary.Lamont@afit.edu

LAURVICK, TOD V. Maj,

Electrical Engineering Division Chief, Assistant Professor of Electric Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2016 (AFIT/ENG); BSEE, Michigan Technological University, 1995; MS, Air Force Institute of Technology, 2009; PhD, Electrical Engineering, Air Force Institute of Technology, 2016. Maj Laurvick's research interests include advancement of micro/nanoscale fabrication techniques and how they apply to sensing and actuation. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4382, email: Tod.Laurvick@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Fission Induced Neutron Detection of Nuclear Materials (FIND'NM)." Sponsor: Undisclosed. Funding: \$290,000 – Laurvick 30%, Petrosky 40%, Hogsed 15%, Cobb 15%. [CSRA]

REFEREED JOURNAL PUBLICATIONS

J.M. Sattler, R.A. Coutu, R. Lake, T. Laurvick, T. Back, S. Fairchild, "Modeling micro-porous surfaces for secondary electron emission control to suppress multipactor," *Journal of Applied Physics*, Vol.122, Issue 5, 2017. [CSRA]

LEISHMAN, ROBERT C.,

Research Assistant Professor of Autonomy, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2016 (AFIT/ENG); BS, Utah State University, 2006; MS, Brigham Young University, 2009; PhD, Mechanical Engineering, Brigham Young University, 2013. Dr. Leishman's research interests include guidance, navigation and control of small unmanned aerial vehicles, GPS-denied navigation using vision systems, and autonomous systems and robotics. He is a member of The Institute of Navigation (ION) and The Institute of Electrical and Electronics Engineers (IEEE), including the IEEE Controls Systems Society (CSS) and IEEE Robotics and Automation Society (RAS). AFIT research center affiliation(s): ANT. Tel. 937-255-3636 x4755, email: Robert.Leishman@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Morphing and Shape Adaptable Aircraft Control, Integration, and Flight Test." Sponsor: AFRL/RQ. Funding: \$150,000 – Leishman 70%, Jacques 30%. [ANT]

"Autonomy Framework Design and Development." Sponsor: USA CERDEC. Funding: \$302,220 – Leishman 50%, Raquet 10%, Peterson 10%, Bindewald 10%. [ANT]

"Robust Navigation Small UAV Research." Sponsor: AFRL/STO. Funding: \$30,000. [ANT]

"Robust Back-end Navigation Techniques." Sponsor: AFRL/RV. Funding: \$50,000. [ANT]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Leishman, R. C., Gray, J., Raquet, J., Rutkowski, A., & Myrick, W. (2018). Bounding Visual Odometry Drift with Radio Range Data for Small Unmanned Aerial Vehicles. In *ION GNSS+*. Miami, FL. [ANT]

Watson, R. M., Taylor, C. N., Leishman, R. C., & Gross, J. N. (2018). Batch Measurement Covariance Estimation for Robust Localization. In *ION GNSS+* (pp. 1–10). Miami, FL. [ANT]

LIEVSAY, JAMES R., Maj,

Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2017 (AFIT/ENG); BSEE, United States Air Force Academy, 2006; MSEE, Air Force Institute of Technology, 2011; PhD, Electrical Engineering, University of Oklahoma, 2017. Maj Lievsay's research interests include radar and array signal processing. AFIT research center affiliation(s): ANT and CTISR. Tel. 937-255-3636 x3369, email: James.Lievsay@afit.edu

REFEREED JOURNAL PUBLICATIONS

J. R. Lievsay and N. A. Goodman, "Modeling Three-Dimensional Passive STAP with Heterogeneous Clutter and Pulse Diversity Waveform Effects," *IEEE Transactions on Aerospace and Electronic Systems*, Vol.54, No. 2, pp. 861-872, 2018

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

J. R. Lievsay and N. A. Goodman, "Passive Radar Large Clutter Discrete Removal," *IEEE Radar Conference*, Oklahoma City, OK, Apr 2018, pp. 1167-1172

LIN, ALAN C. Maj,

Assistant Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2015 (AFIT/ENG); BSCE, Rutgers University, 2004; MSCS, Air Force Institute of Technology, 2008; PhD,

Computer Science, Air Force Institute of Technology, 2015. Maj Lin's research interests include cyber security and education, serious gaming and gamification, data mining, space systems, and software engineering. He is a member of Tau Beta Pi. AFIT research center affiliation(s): CCR.

SPONSOR FUNDED RESEARCH PROJECTS

"Multi-domain Scenario-based Wargaming." Sponsor: 711 HPW. Funding: \$59,946 – Lin 67%, Peterson 33%. [CCR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Sample, K., Lin, A., Borghetti, B., & Peterson, G. (2018). In *Florida Artificial Intelligence Research Society Conference*. Retrieved from <https://aaai.org/ocs/index.php/FLAIRS/FLAIRS18/paper/view/17678/16882>

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MARTIN, RICHARD K.,

Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2004 (AFIT/ENG); BS, Electrical Engineering and Physics, University of Maryland, 1999; MS, Electrical Engineering, Cornell University, 2001; PhD, Electrical Engineering, Cornell University, 2004. Dr. Martin's research interests include source localization, navigation, radio tomographic imaging, and 3D laser radar imaging. AFIT research center affiliation(s): ANT and CCR. Tel. 937-255-3636 x4625, email: Richard.Martin@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Classification Methods and Passive Augmentation of Spectropolarimetric LADAR." Sponsor: AFRL/RW. Funding: \$49,980.

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R. K. Martin, C. Keyser, L. Ausley, and M. Steinke, "Pixel Classification with a Temporally Multiplexed Spectropolarimetric LADAR System," *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 56, No. 7, pp. 3735-3746, July 2018. [ANT,CCR]

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MAYBECK, PETER S.,

Professor Emeritus of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 1973 (AFIT/ENG); BS, Massachusetts Institute of Technology, 1968; PhD, Massachusetts Institute of Technology, 1972. Dr. Maybeck’s research interests include optimal estimation and stochastic control Kalman filtering, adaptive estimation, pointing and tracking, optimally aided inertial navigation systems, and multiple model adaptive filtering. He is the author of the widely recognized three-Volume reference text, “Stochastic Models, Estimation and Control,” and over 100 technical articles. Dr. Maybeck has received numerous national and local awards including the C. Holmes MacDonald Distinguished Young Electrical Engineering Teach and the ASEE Frederick Emmons Terman Award as the outstanding Electrical Engineering Professor in the US and 1985. He is a fellow of the IEEE. AFIT research center affiliation(s): CCR.

MERKLE, LAURENCE D.,

Assistant Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2015 (AFIT/ENG); BS, Computer and Systems Engineering, Rensselaer Polytechnic Institute, 1987; MSCE, Air Force Institute of Technology, 1992; PhD, Computer Engineering, Air Force Institute of Technology, 1996. Dr. Merkle’s research interests include Serious Games, Quantum Information Systems, Computational Science and Engineering, Computing Education, Evolutionary Computation, Secure Computing, Space Situational Awareness. AFIT research center affiliation(s): ANT, CCR, and CSRA. Tel. 937-255-3636 x4526, email: Laurence.Merkle@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Autonomous Correlation of Ground-Based EO Tracks of GEO RSOs.” Sponsor: AFRL/RV. Funding: \$10,000. [CSRA]

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OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

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MILLAR, JEREMY R., Maj,

Assistant Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2017 (AFIT/ENG); BS, University of Tennessee, 2000; MS, Air Force Institute of Technology, 2009; PhD, Computer Science, Air Force Institute of Technology, 2017. Maj Millar's research interests include parallel and distributed systems, modeling and simulation, and software engineering. AFIT research center affiliation(s): CCR.

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Millar, J.R., Hodson, D.D., Peterson, G.L., Ahner, D.K., Optimizing update scheduling parameters for distributed virtual environments supporting operational test, *Concurrency and Computation: Practice and Experience*, 2017; e4156. (<https://doi.org/10.1002/cpe.4156>).

MILLS, ROBERT F.,

Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2003 (AFIT/ENG); BS, Electrical Engineering, Montana State University, 1983; MS, Electrical Engineering, AFIT, 1987; PhD, Electrical Engineering, University of Kansas, 1994. Dr. Mills' research interests include electronic warfare, network security, and cyber resilience in weapon systems. He is a Senior Member of the IEEE and is a member of the Eta Kappa Nu and Tau Beta Pi honor societies. AFIT research center affiliation(s): CCR. Tel. 937-255-3636 x4527, email: Robert.Mills@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Intelligent Channel Sensing Based Secure Cross Layer Cognitive Networking for Resilient Space Communications." Sponsor: OFRN (WSU). Funding: \$70,000 – Mills 50%, Graham 50%. [CCR]

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Wolfe, C.L., Graham, S.R., Mills, R.F., Nykl, S.L., and Simon, P.E., "Securing Data-in-Transit for Power-Limited Sensor Networks using Two-Channel Communication," International Conference of Critical Infrastructure Protection, Mar 2018. [CCR]

Willis, J.M., Mills, R.F., Mailloux, L.O., and Graham, S.R., "Considerations for Secure and Resilient Satellite Architectures," International Conference on Cyber Conflict (CyCon US), Washington DC, Nov 2017, pp.16 - 22. [CCR]

MULLINS, BARRY E.,

Professor of Computer Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2004 (AFIT/ENG); BS, Computer Engineering, University of Evansville, 1983; MS, Computer Engineering, Air Force Institute of Technology, 1987; PhD, Electrical Engineering, Virginia Polytechnic Institute and State University, 1997. Dr. Mullins' research interests include cyber-physical systems security, cyber operations, critical infrastructure protection, computer/network/embedded systems security, wired/wireless networking, and reverse code engineering. AFIT research center affiliation(s): CCR.Tel. 937-255-3636 x7979, email: Barry.Mullins@afit.edu

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L. Bradford, B E. Mullins, S. Dunlap, and M. Reith, "Developing Low-cost and Effective ICS Cyber Training Environments," *13th International Conference on Cyber Warfare and Security ICCWS-2018*, Washington DC, 8-9 March 2018, pp. 47-51. [CCR]

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C. E. Mays, M. Rice, B. W. Ramsey, J. M. Pecarina, and B. E. Mullins, "Defending Building Automation Systems Using Decoy Networks," *Critical Infrastructure Protection XI*, M. Rice and S. Shenoi, eds. Springer, New York, NY, November 2017, pp. 29-49.

NYKL, SCOTT L.,

Assistant Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2015 (AFIT/ENG); BS, Software Engineering, University of Wisconsin-Platteville, 2006; MS, Computer Science, Ohio University, 2012; PhD, Computer Science, Ohio University, 2013. Dr. Nykl's research interests include Computer Graphics, Interactive 3D Graphics, Level of Detail, Image-Based Rendering, GPGPU Programming/Parallel Computation, Distributed Real Time Visualizations, Computer Vision, Computational Geometry, Sensor Fusion, Linear Algebra, Numerical Analysis, Synthetic Vision (SVS), Augmented Reality (AR) Parallel/Concurrent

Programming, Multi-Core/Multi-Threading, Algorithms, Big Data, and Networking, Data Structures. AFIT research center affiliation(s): ANT and CCR. Tel. 937-255-3636 x4395, email: Scott.Nykl@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Reconnaissance Improvement through Secure, Reduced Bandwidth Communication and Cooperative Navigation Using Jetson TX1s.” Sponsor: Undisclosed. Funding: \$5,663 – Nykl 30%, Graham 30%, Pierce 30%, Carbino 10%. [ANT/CCR]

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“Automated Aerial Refueling: Precise Relative Navigation from Stereo Vision, Phase II.” Sponsor: AFRL/RQ. Funding: \$70,000. [ANT]

“Automated Aerial Refueling: Precise Relative Navigation from Stereo Vision, Phase 3.” Sponsor: AFRL/RQ. Funding: \$80,000. [ANT/CCR]

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C. Wolfe, S. Graham, R. Mills, S. Nykl, and P. Simon, “Securing Data-in-Transit for Power-Limited Sensor Networks Using Two-Channel Communication,” in *International Conference of Critical Infrastructure Protection*. IFIP, March 2018.

PACHTER, MEIR,

Professor, Department of Electrical and Computer Engineering, AFIT Appointment Date: 1993 (AFIT/ENG); BS, Israel Institute of Technology, 1967; MS, Israel Institute of Technology, 1969; PhD, Israel Institute of Technology, 1975. Dr. Pachter's fields of expertise include automatic control of aircraft and missiles, adaptive control and system identification, inertial and GPS navigation, autonomous control/neural networks/fuzzy logic control, nonlinear control, and applied mathematics. Dr. Pachter has published papers in these areas and in differential games, robotics, and the theory of computational geometry. Dr. Pachter is interested in the application of mathematics to the solution of engineering and scientific problems. His current areas of interest include military operations optimization, cooperative control, estimation and optimization, statistical signal processing, adaptive optics, inertial navigation, and GPS navigation. For his work on adaptive and reconfigurable flight control, he received the AFRL Air Vehicle's Directorate Foulis Award for 1994 together with Phil Chandler and Mark Mears. AFIT research center affiliation(s): ANT and CCR. Tel. 937-255-3636 x7247, email: Meir.Pachter@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Cooperative Control.” Sponsor: AFRL/RQ. Funding: \$40,000. [ANT]

“Dynamics and Control in Adversarial and Stochastic Environments.” Sponsor: AFOSR. Funding: \$48,600.

“Decision Support Techniques.” Sponsor: AFRL/RV. Funding: \$20,000. [ANT]

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R. Anderson, M. Pachter and R. Murphey: “Barrier Analysis of a 3-Player Pursuit-Evasion Differential Game,” Proceedings of the 58th Israel Annual Conference on Aerospace Sciences, Tel-Aviv & Haifa, Israel, March 14-15, 2018. [ANT]

K. Krishnamoorthy, M. Pachter and D. Casbeer: "Optimal Sequential Resource Allocation under Error-prone Success Assessment," 10th IMA International Conference on Modelling in Industrial Maintenance and Reliability, Manchester, UK, June 13-15 2018.

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PETERSON, GILBERT L.,

Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2002 (AFIT/ENG); BS, Architecture University of Texas at Arlington, 1995; MS, Computer Science, University of Texas at Arlington, 1998; PhD, University of Texas at Arlington, 2001. Dr. Peterson's research interests include uncertainty in artificial intelligence, robotics, machine learning, and digital forensics. AFIT research center affiliation(s): ANT and CCR. Tel. 937-255-6565 x4281, email: Gilbert.Peterson@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Autonomy Capability Design and Development." Sponsor: 711 HPW. Funding: \$280,000. [CCR]

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Sample, K.R., Lin, A.C, Borghetti, B.J., and Peterson, G.L., "Predicting Trouble Ticket Resolution," The 31st International Florida Artificial Intelligence Research Society Conference (FLAIRS-31). Melbourne, FL, May 2018, pp. 201-204. [ANT, CCR]

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Good, R., and Peterson, G., Automated File Provenance Collection, In Peterson, G., Sheno, S. (eds), *Advances in Digital Forensics XIII*, 2017. [CCR]³

Jordan P., Van Patten D., Peterson G., Sellers A. (2018) Distributed PowerShell Load Generator (D-PLG): A Tool for Generating Dynamic Network Traffic. In: Obaidat M., Ören T., Merkuriev Y. (eds) Simulation and Modeling Methodologies, Technologies and Applications. SIMULTECH 2016. *Advances in Intelligent Systems and Computing*, Vol.676. Springer, Cham [CCR]

PIERCE, SCOTT J., Lt Col,

Deputy Head, Department of Electrical and Computer Engineering, Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2014 (AFIT/ENG); BS, Electrical Engineering, Brigham Young University, 2002; MSEE, Air Force Institute of Technology, 2008; PhD, Air Force Institute of Technology, 2015. Maj Pierce's research interests include image-aided navigation, autonomous control, cooperative navigation, sensor fusion, and flight path optimization. He is a member of ION and IEEE. AFIT research center affiliation(s): ANT. Tel. 937-255-3636 x3419, email: Scott.Pierce@afit.edu

REFEREED JOURNAL PUBLICATIONS

Carr, R., Cobb, R., Pachter, M., Pierce, S., "Solution of a Pursuit-Evasion Game Using a Near-Optimal Strategy," *Journal of Guidance, Control, and Dynamics*, Vol. 41, No. 4 (2018), pp. 841-850. [ANT]

PYATI, VITTAL P.,

Professor Emeritus of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 1983 (AFIT/ENG); BE, University of Madras, India, 1953; MSE, Marquette University, 1962; PhD, Electrical Engineering, University of Michigan, 1966. Dr. Pyati's fields of expertise include electromagnetics, radar, low observables, and electronic warfare. Dr. Pyati has authored over 40 publications in journals and DOD conferences. He has been a consultant to various Air Force organizations.

RAQUET, JOHN F.,

Director of the Autonomy and Navigation Technology Center, Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 1998 (AFIT/ENG); BS, US Air Force Academy, 1989; MS, Massachusetts Institute of Technology, 1991; PhD, University of Calgary, Canada, 1998. Dr. Raquet's areas of interest include Global Positioning System (GPS) precise positioning, non-GPS precision navigation, optically-aided navigation, navigation 101 using signals of opportunity, integration of MEMS-based inertial measurement units with other sensors, autonomous vehicle navigation and control, and electromagnetic interference and mitigation techniques affecting GPS performance. AFIT research center affiliation(s): ANT. Tel. 937-255-3636 x4580, email: John.Raquet@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"ANT Center and Laboratory Support per MOA between AFIT and AFRL." Sponsor: AFRL/RY. Funding: \$200,000 – Raquet 50%, Pierce 50%. [ANT]

"Ultra-High Accuracy Reference System (UHARS) Support." Sponsor: 746 TS. Funding: \$140,000. [ANT]

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SPONSOR FUNDED EDUCATIONAL PROJECTS

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Weathers, D. and J. Raquet, “Sound Based Positioning,” *Proceedings of ION GNSS+ 2017*, Portland, OR, Sep 2017. [ANT]

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REITH, MARK G., Lt Col,

Director of Center for Cyberspace Research, Assistant Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2016 (AFIT/ENG); BS, Computer Science, University of Portland, 1999, MSCS, Air Force Institute of Technology, 2003; PhD, Computer Science, University of Texas at San Antonio, 2009. Lt Col Reith’s research interests include cyber warfare theory and operation, software engineering, and software security and exploitation. AFIT research center affiliation(s): CCR. Tel. 937-255-3636 x4603, email: Mark.Reith@afit.edu

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STONE, SAMUEL J., Maj,

Adjunct Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2013 (AFIT/ENG); BS, Computer Engineering, Wright State University, 2003; MS, Electrical Engineering, Air Force Institute of Technology, 2008; PhD, Electrical Engineering, Air Force Institute of Technology, 2013. Maj Stone's research interests include Radio Frequency Intelligence, VLSI design, anti-tamper semiconductor hardware design, counterfeit device detection, and device design verification.

TEMPLE, MICHAEL A.,

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“Application of RF-DNA to Enhance Transition of Functional Materials, Devices, and Components.” Sponsor: AFRL/RX. Funding: \$120,000 – Temple 50%, Carbino 50%. [CCR]

“(U) Application of DML to RFINT.” Sponsor: Undisclosed. Funding: \$49,944. [CCR]

“RF-EW Systems Support.” Sponsor: AFRL/RX. Funding: \$75,000. [CCR]

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TERZUOLI, ANDREW J., Jr.,

Associate Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 1982 (AFIT/ENG); BS, Electrical Engineering, Polytechnic Institute of Brooklyn, 1969; MS, Electrical Engineering, Massachusetts Institute of Technology, 1970; PhD, Electrical Engineering, The Ohio State University, 1982. Dr. Terzuoli’s research areas have included Antennas and Electromagnetics; Computer Model Based Studies; Application of Parallel Computation, VLSI Technology, and RISC Architecture to Numerical and Transform Methods; Remote Sensing and Communication; Passive RF Sensing; Wave Scattering, Radar Cross Section, and Stealth (LO/CLO) Technology; Machine Vision and Image Processing; and Automated Object Recognition. He has published numerous reports and articles in journals and conference proceedings in these and related areas. His research is funded by various agencies including AFRL and NASIC. Prior to joining AFIT in 1982, Dr. Terzuoli was a research associate at the ElectroScience laboratory at The Ohio State University and was a member of the technical staff at the

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SPONSOR FUNDED RESEARCH PROJECTS

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5.3. DEPARTMENT OF ENGINEERING PHYSICS

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5.3.1. DOCTORAL DISSERTATIONS

ADOMANIS, BRYAN M., Design and Optimization of Plasmonic 3-D Huygens Metasurface Building Blocks for Highly-Efficient Flat Optics AFIT/ENP/DS/18S-018. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: AFOSR. [CDE]

CEZEAUX, JASON R., Characterizations of Particles Formed During Non-Critical Nuclear Weapons Accidents AFIT/ENP/DS/18S-021. Faculty Advisor: Dr. James C. Petrosky. Sponsor: 711 HPW/RH.

DAVILA, RICARDO C., Two-Photon Excitation of Cesium Alkali Metal Vapor 72D, 82D Kinetics and Spectroscopy. AFIT/ENP/DS/18M-076. Faculty Advisor: Dr. Glen P. Perram. Sponsor: MDA. [CDE]

FORD, MICHAEL A., Neutron Spectroscopy Using Rubberized Eu:LiCAF Wafers AFIT/ENP/DS/18S-024. Faculty Advisor: LTC Buckley E. O'Day. Sponsor: DTRA.

LANE, CORY T., In-Scene Atmospheric Compensation of Thermal Hyperspectral Imaging with Applications to Simultaneous Shortwave Data Collection. AFIT/ENP/DS/17D-008. Faculty Advisor: Dr. Kevin C. Gross. Sponsor: NASIC. [CTISR]

PAULEC, MASON D., Reconstruction of the 3D Temperature and Species Concentration Spatial Distribution of a Jet Engine Exhaust Plume Using an Infrared Fourier Transform Spectrometer Hyperspectral Imager AFIT/ENP/DS/18S-025. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: N/A. [CDE/CTISR]

SHEPHERD, JACK A., Evaluation and Quantification of Diffractive Plenoptic Camera Algorithm Performance AFIT/ENP/DS/18S-026. Faculty Advisor: Lt Col Anthony L. Franz. Sponsor: AFOSR. [CTISR]

VAN ZANDT, NOAH R., The Benefits of Polychromatic Speckle Mitigation for Shake Hartmann Wavefront Sensors. AFIT/ENP/DS/17D-009. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: AFRL/RD. [CDE]

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- ANDERSON, PETER D., Machine Learning Approach to Identification of Seismic Events. AFIT/ENP/MS/18M-070. Faculty Advisor: Dr. James C. Petrosky. Sponsor: AFTAC.
- BRYANT, TODD A., Characterization of Heavy Charged Particle Exposure on the Radiation Resistant Bacterium, *Deinococcus Radiodurans*. AFIT/ENP/MS/18M-071. Faculty Advisor: LTC Douglas R. Lewis. Sponsor: 711 HPW/USAFSAM.
- CONDON, ZACHARY T., Multisource Direction Identification Using a Rotating Scatter Mask. AFIT/ENP/MS/18M-073. Faculty Advisor: LTC Buckley E. O'Day. Sponsor: DTRA.
- CRUZ, DIANA, Radiation Induced Defects in High-Z Shielded Ytterbium Doped Fibers. AFIT/ENP/MS/18M-074. Faculty Advisor: Maj Samuel D. Butler. Sponsor: DTRA.
- DAUGHTRY, RICHARD F., Characterization of Silicon Ion Exposure on *Deinococcus Radiodurans*. AFIT/ENP/MS/18M-075. Faculty Advisor: LTC Douglas R. Lewis. Sponsor: 711 HPW/USAFSAM.
- DIAZ, CARLOS D., Spatial Resolution and Contrast of a Focused Diffractive Plenoptic Camera. AFIT/ENP/MS/18M-077. Faculty Advisor: Lt Col Anthony L. Franz. Sponsor: N/A.
- DUNSMORE, ANITA N., Using an Astrophysical Model to Characterize Nuclear Dust. AFIT/ENP/MS/18M-079. Faculty Advisor: Dr. John W. McClory. Sponsor: DTRA.
- GARZA, TANIA M., The geographic distribution of downburst frequency across Spaceport Florida. AFIT/ENP/MS/18M-082. Faculty Advisor: Maj Omar A. Nava. Sponsor: 45 WS.
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- HOAK, STEVEN M., Native Defect Characterization of Single Crystal UO₂ Pre- and Post-Neutron Irradiation. AFIT/ENP/MS/18M-084. Faculty Advisor: Dr. James C. Petrosky. Sponsor: DNDO.
- HOLDEN, NANCY M., Forecasting Lightning Cessation using Dual-Polarization Radar and Lightning Mapping Array Near Washington, DC. AFIT/ENP/MS/18M-085. Faculty Advisor: Maj Omar A. Nava. Sponsor: 45 WS.
- KERST, AMY M., Investigation of Scramjet Flowfield Temperatures at the Boundary Layer with Hyperspectral Imaging AFIT/ENP/MS/18J-011. Faculty Advisor: Dr. Kevin C. Gross. Sponsor: AFOSR. [CTISR]
- KNIPPLING, KALEN L., A Comparison of High Frequency Angle of Arrival and Ionosonde Data During a Traveling Ionospheric Disturbance. AFIT/ENP/MS/18M-087. Faculty Advisor: Maj Daniel J. Emmons. Sponsor: AFRL/RV.
- MAYO-JOHNSON, JEREMY A., Validation of a Midwave Infrared Nighttime Cloud Mask. AFIT/ENP/MS/18M-089. Faculty Advisor: Lt Col Robert A. Stenger. Sponsor: N/A. [CTISR]
- MERRIMAN, CAMERON A., Modeling Ground Burst Electromagnetic Pulse for Nuclear Weapon Diagnostics. AFIT/ENP/MS/18M-090. Faculty Advisor: Lt Col James R. Fee, Jr. Sponsor: N/A.
- OLESEN, ROBERT J., Optimization and Parameter Characterization for Rotating Scatter Mask Designs. AFIT/ENP/MS/18M-091. Faculty Advisor: LTC Buckley E. O'Day. Sponsor: DTRA.
- OLSEN, SARAH A., Forecasting Lightning Initiation Utilizing Dual-Polarization Parameters Over Washington, DC. AFIT/ENP/MS/18M-092. Faculty Advisor: Maj Omar A. Nava. Sponsor: 45 WS.

OSTLER, JAY E., Modeling an Actinide-Based, Direct-Conversion Neutron Detector. AFIT/ENP/MS/18M-093.
Faculty Advisor: Dr. James C. Petrosky. Sponsor: DNDO.

PERKINS, MATTHEW W., Methodology to Analyze Tropical Cyclone Intensity from Microwave Imagery.
AFIT/ENP/MS/18M-094. Faculty Advisor: Lt Col Robert A. Stenger. Sponsor: JTWC.

PETERSON, RICHARD D., Excited Argon 1s₅ Production in Microhollow Cathode Discharges.
AFIT/ENP/MS/18M-095. Faculty Advisor: Dr. Glen P. Perram. Sponsor: DEJTO.

PITKINS, CHRISTOPHER R., Improving Fallout Characterization by Using Multivariate Techniques to Determine Composition. AFIT/ENP/MS/18M-080. Faculty Advisor: Dr. John W. McClory. Sponsor: DTRA.

SAUER, STEVEN G., Effects of Artificial Aging on Paint Thermal Flash Characteristics. AFIT/ENP/MS/18M-096.
Faculty Advisor: Dr. James C. Petrosky. Sponsor: AFNWC.

SMITH, NATHAN D., Impacts of Sub-Auroral Polarization Streams on High Frequency Operations as a Function of Modeled Particle Energy Flux. AFIT/ENP/MS/18M-097. Faculty Advisor: Dr. Robert D. Loper. Sponsor: 2 WS.

STICKNEY, JASON R., Pulse Height Spectra Analysis of a Neutron Energy Tuning Assembly. AFIT/ENP/MS/18M-098. Faculty Advisor: Capt James E. Bevins. Sponsor: DTRA.

5.3.3. FACULTY BIOGRAPHIES & RESEARCH OUTPUT

Notes: Research Center affiliations are listed in [] if applicable. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

BAILEY, WILLIAM F.,

Associate Professor Emeritus of Physics, Department of Engineering Physics, AFIT Appointment Date: 1978 (AFIT/ENP); BS, United States Military Academy, 1964; MS, The Ohio State University, 1966; PhD, Air Force Institute of Technology, 1978. Dr. Bailey's research interests center on weakly ionized gases and reactive kinetics with special applications to semiconductor processing in gas discharges, shock characterization in ionized flows, and solutions of the inhomogeneous electron kinetic equation. Dr. Bailey has published over 20 papers in refereed conference proceedings and international journals and chaired over 25 theses and dissertations. He is a member of Tau Beta Pi, Sigma Pi Sigma, and Sigma Xi. Tel. 937-255-3636 x4501, email: William.Bailey@afit.edu

BEVINS, JAMES E., Capt,

Assistant Professor of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 2017 (AFIT/ENP); BS, Nuclear Engineering, University of Tennessee, 2009; MS, Nuclear Engineering, Air Force Institute of Technology, 2011; PhD, Nuclear Engineering, University of California – Berkeley, 2017. Capt Bevins research interests include experimental and modeling research in the areas of nuclear forensics, nuclear detection, nuclear data, radiation transport, and applied optimization design of nuclear systems. Capt Bevins has authored 9 refereed archival journal publications and 17 refereed conference proceedings. He holds two notices of invention. He has successfully advised two Master's students and is currently advising three MS students and one PhD student. Tel. 937-255-3636 x4767, email: James.Bevins@afit.edu

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R. J. Olesen, B. E. O'Day, D. E. Holland, L. W. Burggraf, and J. E. Bevins, "Characterization of Novel Rotating Scatter Mask Designs for Gamma Direction Identification," *Nuclear Instrumentation and Methods in Physics Research Section A*, <https://doi.org/10.1016/j.nima.2018.09.067>

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BICKLEY, ABIGAIL, A.

Research Assistant Professor of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 2017 (AFIT/ENP); BA, Dartmouth College, 2000; PhD, University of Maryland, 2004. Dr. Bickley's expertise is in nuclear forensics and radiation transport. Her current research focuses on the characterization of radiological and nuclear samples for nuclear forensics signature identification and software development of statistical analysis tools for nuclear forensics applications. In addition, Dr. Bickley is examining neutral particle transport in the space environment. Before joining AFIT, she was on the faculty of Michigan State University and worked in nuclear treaty monitoring. Dr. Bickley is a member of the American Physical Society (APS) and American Chemical Society (ACS). Tel. 937-255-3636 x4555, email: Abigail.Bickley@afit.edu

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Bose-Pillai, S. R., J.E. McCrae, C.A. Rice, R.A. Wood, C.E. Murphy, and S.T. Fiorino, "Estimation of atmospheric turbulence using differential motion of extended features in time-lapse imagery," *Optical Engineering*, vol. 57, no.10, 104108 (14pp.), 2018, doi: 10.1117/1.OE.57.10.104108. [CDE]

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Santasri Bose-Pillai, Jack McCrae, Christopher Rice, and Steven Fiorino, “Characterizing atmospheric turbulence over long paths using time-lapse imagery,” *20th Annual DEPS S+T Symposium*, Oxnard, CA, 26 Feb – 02 Mar, 2018. [CDE]

Jack McCrae, Santasri Bose-Pillai, Christopher Rice, and Steven Fiorino, “Analysis of Tilt Removed Hartmann Turbulence Sensor Data,” *20th Annual DEPS S+T Symposium*, Oxnard, CA, 26 Feb – 02 Mar, 2018. [CDE]

Steven Fiorino, Kevin Keefer, Jack McCrae, and Santasri Bose-Pillai, “Advantages of Quantifying Velocity Structure Function, C_v2 to Infer Refractive Structure Function, C_n2 ,” *20th Annual DEPS S+T Symposium*, Oxnard, CA, 26 Feb – 02 Mar, 2018. [CDE]

PATENT APPLICATIONS

Milo W. Hyde and Santasri R. Bose-Pillai, “Generation of Vector Partially Coherent Optical Sources Using Phase-Only Spatial Light Modulators,” provisional application filed in Oct 2017. [CDE]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Participated in a joint atmospheric characterization field campaign with AFRL RYM in April, 2018.

Participated and gave an invited talk at AFRL RD’s Distributed Volume Turbulence Working Group meeting on AFIT’s efforts in characterizing the lower atmosphere. [CDE]

BURGGRAF, LARRY W.,

Professor of Engineering Physics and Chemical Physics, Department of Engineering Physics, AFIT Appointment Date: 1994 (AFIT/ENP); BA, Chemistry, Olivet Nazarene University, 1968; MS, Chemistry, The Ohio State University, 1971; MA, Applied Mathematics, University of West Florida, 1977; PhD, Chemistry, University of Denver, 1981; Post-doctoral Associate, Computational Chemistry, Iowa State University, 1993. Dr. Burggraf conducts experimental and theoretical research in physical chemistry and materials chemistry including radiation biophysics, exotic atom chemistry, positron spectroscopy, surface and cluster spectroscopy, excitonic nanomaterials, atomic force microscopy, gamma spectroscopy and gamma imaging to solve DOD, DHS and DOE problems in WMD non-proliferation. Theoretical research to model surfaces, clusters, nanomaterials and exotic-atom molecules applies quantum mechanics modeling to interpret experimental results. Dr. Burggraf has authored more than 55 refereed archival publications. He holds one patent. He has successfully advised 45 Master’s students, eight PhD students, and is currently advising one MS and one PhD student. Tel. 937-255-3636 x4507, email: Larry.Burggraf@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Modeling for High Temperature Materials Diagnostics using Positron Spectrometry.” Sponsor: AFRL/RQ. Funding: \$15,000.

“Materials Science of Defect Centers for Quantum Sensing; First-principles Design of Defect Centers for Quantum Sensing.” Sponsor: AFRL/RX. Funding: \$20,000.

REFEREED JOURNAL PUBLICATIONS

D.E. Holland, J.E. Bevin, L.W. Burggraf, B.E. O’Day, “Rotating scatter mask optimization for gamma source direction identification,” *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, Vol. 901, pp. 104-111 (2018).

J. J. Lutz, X. F. Duan, and L. W. Burggraf, “Semiconductor color-center structure and excitation spectra: Equation-of-motion coupled-cluster description of vacancy and transition-metal defect photoluminescence,” *Physical Review B*, 97, 115108 (2018).

“J.J. Lutz, X. F. Duan, D. S. Ranasinghe, Y. Jin, J. T. Margraf, A. Perera, L. W. Burggraf, and R. J. Bartlett, “Valence and charge-transfer optical properties for some SinCm ($m, n \leq 12$) clusters: Comparing TD-DFT, complete-basis-limit EOMCC, and benchmarks from spectroscopy,” *The Journal of Chemical Physics* 148, 174309 (2018).

X.F. Duan and L.W. Burggraf, "The Closo-Si12C12 Molecule from Cluster to Crystal: Effects of Hydrogenation and Oligomerization on Excited States," *Journal of Chemical Physics* 146, 234302 (2017).

R. J. Olesen, B. E. O'Day, D. E. Holland, L. W. Burggraf, and J. E. Bevins, "Characterization of Novel Rotating Scatter Mask Designs for Gamma Direction Identification," *Nuclear Instrumentation and Methods in Physics Research Section A*, <https://doi.org/10.1016/j.nima.2018.09.067>

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

D. E. Holland, J. E. Bevins, L. W. Burggraf, and B. E. ODay, "Rotating scatter mask optimization for gamma source direction identification," presented at the *2018 Symposium on Radiation Measurement and Analysis* in Ann Arbor, MI on 12 June 2018.

R. J. Olesen, B. O. Day, D. Holland, L. Burggraf, and J. Bevins, "Characterization of Rotating Scatter Mask Designs for Novel Applications in Photon Detection," presented at the *2018 Symposium on Radiation Measurement and Analysis* in Ann Arbor, MI on 12 June 2018.

Z. T. Condon, L. W. Burggraf, J. V. Logan, B. E. ODay, R. J. Olesen, J. E. Bevins, and J. C. Petrosky, "Multisource Location Using a Rotating Scatter Mask to Predictably Attenuate Full Energy Gamma-Ray Emissions," presented at the *Hardened Electronics and Radiation Technology Technical Interchange Meeting*, Tucson, AZ, 19 April 2018.

BURGI, KENNETH, W., Lt Col,

Assistant Professor of Optical Engineering, Department of Engineering Physics, AFIT Appointment Date: 2016 (AFIT/ENP); BS, Michigan Technological University, 2002; MS, Michigan Technological University, 2010; PhD, Air Force Institute of Technology, 2016. Lt Col Burgi's research focus is primarily the development of methods to control reflectively scattered light from rough surfaces. These methods could be used to reconstruct images of objects without direct line-of-sight using scattered light. As a former instructor pilot, Lt Col Burgi has deployed three times in support of Operation Enduring Freedom and Operation Iraqi Freedom. He has flown 1,295 combat flight hours in 363 combat sorties in the C-17 and MC-12 aircraft. He has published two referred journal articles and two conference publications. Lt Col Burgi is a member of SPIE and the current Engineering Physics Interim Department Head. AFIT research center affiliation(s): CDE. Tel. 937-255-3636 x4696, email: Kenneth.Burgi@afit.edu

BUTLER, SAMUEL D., Maj,

Assistant Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 2015 (AFIT/ENP); BS, Applied Physics (Computer Science Emphasis), Brigham Young University, 2004; MS, Physics, Air Force Institute of Technology, 2010; PhD, Physics, Air Force Institute of Technology, 2015. Maj Butler's research is primarily focused on development of optical scatter models for use in remote sensing applications, particularly in the IR. He has also previously been involved in munitions development, quantum mechanical scattering, cryptography, and quantum information. Maj Butler has published two refereed journal articles and eight conference presentations. He has also deployed to Afghanistan as a deputy IG in support of Operation Enduring Freedom in 2011, and to Southwest Asia in 2016. Maj Butler is a member of SPIE and the AFIT chapter co-advisor of SPIE. AFIT research center affiliation(s): CDE and CTISR. Tel. 937-255-3636 x4385, email: Samuel.Butler@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

B. E. Ewing and S. D. Butler. "Grazing angle experimental analysis of modification to microfacet BRDF model for improved accuracy," *Proc. SPIE*, 106441I (May 2018).

D. Cruz, S. D. Butler, and B. J. Singleton. "Radiation induced defects in high-Z shielded Ytterbium doped fibers," *Proc. SPIE*, 106290E (May 2018).

CAYLOR, MICHAEL, J.,

Associate Director, Center for Technical Intelligence Studies & Research, and Research Assistant Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 2017 (AFIT/ENP); BS, Aerospace Engineering, University of Notre Dame, 1981; MS, Aerospace Engineering, University of Notre Dame, 1983; MS,

Engineering Management, Florida Institute of Technology, 1985; PhD, Aerospace Engineering, University of Notre Dame, 1993. AFIT research center affiliation(s): CTISR. Tel. 937-255-3636 x4565, email: Michael.Caylor@afit.edu

CLINTON, JUSTIN A.,

Assistant Professor of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 2013 (AFIT/ENP); BS, Nuclear Engineering, Rensselaer Polytechnic Institute, 2004; PhD, Nuclear Engineering, Rensselaer Polytechnic Institute, 2011. Dr. Clinton's research interests are in the area of radiation detection, both experimental and theoretical modeling, as it applies to nuclear forensics. His expertise includes particle transport, Monte Carlo methods, analog and digital data acquisition and analysis, and detector development. Dr. Clinton is a member of the American Nuclear Society (ANS) as well as the Institute of Electrical and Electronics Engineers (IEEE). AFIT research center affiliation(s): ANT. Tel. 937-255-6565 x4586, email: Justin.Clinton@afit.edu

REFEREED JOURNAL PUBLICATIONS

A.W. Decker, S.A. Heider, M. Millett, S.R. McHale, J.A. Clinton, J.W. McClory, "Verification and Validation of MCNP6.1 Neutron Protection Factor Estimates of an Armored Vehicle Surrogate Using the White Sands Missile Range Fast Burst Reactor," *Journal of Radiation Effects, Research and Engineering*, Vol. 36, No. 1, pp. 65-70, April 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

W. J. Erwin, J. W. McClory, E. Cazalas, J. A. Clinton, A. W. Decker, "Measurements of the Prompt Gamma Emission Spectrum from the Fast Burst Reactor," presented at the *2018 Hardened Electronics and Radiation Technology Conference* in Tucson, AZ on 17 April 2018.

B. D. Campbell, J. W. McClory, J. A. Clinton, B. Barber, G. Hansen "Integration of Protection for Multiple Threats in Composite Materials," presented at the *2018 Hardened Electronics and Radiation Technology Conference* in Tucson, AZ on 19 April 2018.

DEXTER, MICHAEL L., Lt Col,

Assistant Professor of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 2017 (AFIT/ENP); BS, Applied Physics, University of Nebraska at Omaha, 2004; MS, Applied Physics, Air Force Institute of Technology, 2009; PhD, Nuclear Physics, Air Force Institute of Technology, 2015. Lt Col Dexter's research interests include investigation and development of forensic techniques and radioisotope propulsion. He is deploying in November 2018 in support of Operation Inherent Resolve as the first-ever subject matter expert (SME) for combating weapons of mass destruction (CWMD). Tel. 937-255-3636 x4742, email: Michael.Dexter@afit.edu

EMMONS, DANIEL J, Maj,

Assistant Professor of Physics, Department of Engineering Physics, AFIT, Appointment Date: 2017 (AFIT/ENP); BS, Physics, San Diego State University, 2007; MS, Applied Physics, Air Force Institute of Technology, 2012; PhD, Applied Physics, Air Force Institute of Technology, 2017. Maj Emmons' research interests center on computational gas discharge modeling, plasma kinetics, and the effects of ionospheric disturbances on high frequency radio wave propagation. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4571, email: Daniel.Emmons@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Using GPS Radio Occultation Data to Monitor Sporadic-E." Sponsor: AFRL/RV. Funding: \$18,000. [CSRA]

REFEREED JOURNAL PUBLICATIONS

Emmons, D. J., D. E. Weeks, B. Eshel, and G. P. Perram. "Metastable Ar(1s5) density dependence on pressure and argon-helium mixture in a high pressure radio frequency dielectric barrier discharge." *Journal of Applied Physics* 123, No. 4 (2018): 043304.

Emmons, D. J., and D. E. Weeks. "Kinetics of high pressure argon-helium pulsed gas discharge." *Journal of Applied Physics* 121, No. 20 (2017): 203301.

Emmons, D., A. Acebal, A. Pulkkinen, A. Taktakishvili, P. MacNeice, and D. Odstrcil. "Ensemble forecasting of coronal mass ejections using the WSA-ENLIL with CONED Model." *Space Weather* 11, No. 3 (2013): pp. 95-106.

FEE, JAMES R. Jr., Lt Col,

Section Commander, AU Det 1; Assistant Professor of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 2015 (AFIT/ENP); BS, Purdue University, 1997; MS, Air Force Institute of Technology, 2002; PhD, Air Force Institute of Technology, 2015. Lt Col Fee's research is primarily focused on computational simulation of nuclear weapon effects with a focus in electromagnetic pulse. He has also previously managed radiation hardened microelectronics programs for satellite and missile systems. Lt Col Fee has published one refereed journal article and one conference presentation. He also deployed to Iraq as an Intelligence Advisor in support of Operation New Dawn. Lt Col Fee holds a Master of Military Operational Art and Science from Air University (2012). Tel. 937-255-3636 x4438, email: James.Fee@afit.edu

FERDINANDUS, MANUEL R., Maj,

Assistant Professor of Optical Sciences, Department of Engineering Physics, AFIT Appointment Date: 2014 (AFIT/ENP); BS, Seattle University, 1999; MS, Rochester Institute of Technology, 2007; PhD, University of Central Florida, 2014. Maj Ferdinandus performs research into nonlinear optics, optical limiting, infrared laser sources and hyperspectral target detection. Previously he has worked in space operations and satellite system acquisition. He has published two refereed journal articles and seven conference presentations. Maj Ferdinandus is a member of the Optical Society of America. AFIT research center affiliation(s): CDE and CSRA. Tel. 937-255-6565 x4339, email: Manuel.Ferdinandus@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Ferdinandus, M. R., et al. "Modified Z-scan technique using a segmented photodiode," *Photonics West, SPIE* (2018)

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Bullard, T., Ferdinandus, M. R., et al. "Tunable Broadband Radiation Generated Via Ultrafast Laser Illumination of an Inductively Charged Superconducting Ring," *Applied Superconductivity Conference* (2018)

Ferdinandus, M. R., Gengler, J., et al. "Nonlinear Optical Measurements of thin film titanium nitride about the epsilon near zero point. CLEO: QELS Fundamental Science," *Optical Society of America* (2018)

FIORINO, STEVEN T.,

Director, Center for Directed Energy, and Associate Professor of Atmospheric Physics, Department of Engineering Physics, AFIT Appointment Date: 2003 (AFIT/ENP); BS, Geography (Climatology), The Ohio State University, 1987; BS, Meteorology, Florida State University, 1989; MS, Atmospheric Dynamics, The Ohio State University, 1993; PhD, Physical Meteorology, Florida State University, 2002. Dr. Fiorino's research interests include retrieving environmental parameters via microwave remote sensing; developing signal processing algorithms to fuse meteorological data collection with non-weather ISR platforms; evaluating uncertainty in high-energy laser engagement due to atmospheric effects; and improving microphysical characterizations for nuclear fallout, transport, and dispersion. He has published broadly in meteorological, directed energy, and military journals. Dr. Fiorino is a member of the American Meteorological Society (AMS), American Institute of Aeronautics and Astronautics (AIAA), the Directed Energy Professional Society (DEPS), Society of Photo-Instrumentation Engineers (SPIE), the Optical Society (OSA), and additionally holds a Master of Military Operational Art and Science from Air University (2003). AFIT research center affiliation(s): CDE, CSRA, and CTISR. Tel. 937-255-3636 x4506, email: Steven.Fiorino@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Atmospheric Effects Inputs for HEL JWS and JLaSE." Sponsor: OSD. Funding: \$110,000. [CDE]

"AFIT Research in Support of ONR's US-India OSD-DRDO Collaborations." Sponsor: ONR. Funding: \$50,000 – Fiorino 25%, Sritharan 25%, Akers 25%, Reeger 25%. [CDE]

“LEEDR Code Conversion to C/C++ for AFSIM.” Sponsor: AFLCMC. Funding: \$200,000. [CDE]

“2018 AFIT Center for Directed Energy Summer Intern (DESI) Program.” Sponsor: DEJTO. Funding: \$65,000. [CDE]

“2018 AFIT Center for Directed Energy DoD HPCMP HPC Internship Program (HIP).” Sponsor: HPCMP. Funding: \$48,000. [CDE]

“CY2018 DE JTO AP TAWG Research and Analysis.” Sponsor: DEJTO. Funding: \$400,000. [CDE]

“CY2018 DE JTO M&S TAWG Product Development.” Sponsor: DEJTO. Funding: \$400,000. [CDE]

“AFIT CDE Support to the EHEL PA.” Sponsor: DEJTO. Funding: \$60,000 – Fiorino 50%, McCrae 50%. [CDE]

“Probabilistic and Predictive HEL Performance Analyses for SDPE.” Sponsor: AFLCMC. Funding: \$100,000. [CDE]

“Weather Effects for Integrated HEL / KE Weapons Capabilities Analyses (Revised).” Sponsor: AFRL/RD. Funding: \$199,999. [CDE]

“Airborne Aero-Optics Laboratory-Beam Control.” Sponsor: DEJTO. Funding: \$240,000. [CDE]

SPONSOR FUNDED EDUCATIONAL PROJECTS

“Laser Environmental Effects Definition and Reference (LEEDR) Short Course for NASIC.” Sponsor: NASIC. Funding: \$8,058. [CDE]

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Van Zandt, N. R., M. F. Spencer, M. J. Steinbock, B. M. Anderson, M. W. Hyde, and S. T. Fiorino, 2018: “Polychromatic wave-optics models for image-plane speckle. 2. Unresolved objects,” *Appl. Opt.* Vol. 57, pp. 4103-4110. [CDE]

Van Zandt, N. R., J. E. McCrae, M. F. Spencer, M. J. Steinbock, M. W. Hyde, and S. T. Fiorino, 2018: “Polychromatic wave-optics models for image-plane speckle. 1. Well-resolved objects,” *Appl. Opt.* Vol. 57, pp. 4090-4102. [CDE]

Burley, J.L., S.T. Fiorino, B. Elmore, and J. Schmidt, 2017: “A Fast Calculating Two-Stream-Like Multiple Scattering Algorithm that Captures Azimuthal and Elevation Variations” *J. Appl. Meteor. Climatol.* 56:11, pp. 3049-3063. DOI:10.1175/JAMC-D-17-0044.1. [CDE]

Bose-Pillai, S. R., J.E. McCrae, C.A. Rice, R.A. Wood, C.E. Murphy, and S.T. Fiorino, “Estimation of atmospheric turbulence using differential motion of extended features in time-lapse imagery,” *Optical Engineering*, vol. 57, no.10, 104108 (14pp.), 2018, doi: 10.1117/1.OE.57.10.104108. [CDE]

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McCrae, J.E., S.R. Bose-Pillai, C.A. Rice, and S.T. Fiorino, “Global tilt removal on a Hartmann turbulence sensor,” *Proc. SPIE* 10770, Laser Communication and Propagation through the Atmosphere and Oceans VII, 107700V (18 Sep 2018). [CDE]

Bose-Pillai, S.R., J.E. McCrae, M.D. Wilson, A.L. Back, C.A. Rice, and S.T. Fiorino, “Profiling of atmospheric turbulence along a path using two beacons and a Hartmann turbulence sensor,” *Proc. SPIE* 10772, Unconventional and Indirect Imaging, Image Reconstruction, and Wavefront Sensing 2018, 107720C, (18 Sep 2018). [CDE]

Fiorino S.T., K. Keefer, A. Archibald, and L. Burchett, "An Analysis of Near-Surface Optical Turbulence and Aerosol Concentration Coupling during a Solar Eclipse," in *Propagation Through and Characterization of Atmospheric and Oceanic Phenomena* (pcAOP), Orlando, FL, (OSA, 27 June 2018). Invited. [CDE]

Basu, S. S. Bose-Pillai, S.T. Fiorino, and J.E. McCrae, "Evaluating a Coupled Mesoscale Modeling and Ray Tracing Framework over an Urban Area," in *Propagation Through and Characterization of Atmospheric and Oceanic Phenomena* (pcAOP), OSA Orlando, FL, (OSA, 25-28 Jun 2018). [CDE]

Bose-Pillai, S.R., J.E. McCrae, R.A. Wood, C.E. Murphy, C.A. Rice, S.T. Fiorino, "Characterizing atmospheric turbulence over long paths using time-lapse imagery," *Proc. SPIE* 10650, Long-Range Imaging III, 106500A (11 May 2018); doi: 10.1117/12.2305077. [CDE]

McCrae, J.E. S.R. Bose-Pillai, S.T. Fiorino, and M.W. Hyde IV, "Improved Filtering of Source Plane Tilts for Optical Propagation Simulations," *2018 IEEE Aerospace Conference*, Big Sky, MT, 3-10 Mar 2018. [CDE]

McCrae, J.E. C.E. Murphy, S.R. Bose-Pillai, C.A. Rice, and S.T. Fiorino, "The Influence of Wind on Anisotropy in Optical Turbulence," *2018 IEEE Aerospace Conference*, Big Sky, MT, 3-10 Mar 2018. [CDE]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Fiorino, S.T., S.R. Bose-Pillai, and K.J. Keefer, "In-Situ, Field Profiling of Turbulence Conservative Passive Scalars Using 3D Sonic Anemometers," *13th Annual Directed Energy Systems Symposium*, Portsmouth, VA, September 2018. [CDE]

Schmidt, J., S.T. Fiorino, S. Peckham, and K.J. Keefer, "Evaluation of Aerosol Models in Emerging High Energy Laser Modeling Technologies," *13th Annual Directed Energy Systems Symposium*, Portsmouth, VA, September 2018. [CDE]

Schmidt, J., S.T. Fiorino, S. Bose-Pillai, B. Elmore, K.J. Keefer, and J. Bills, "Combining HPC and 4D Weather Cubes for Practical DE Decision Aids and System Performance Trades," *13th Annual Directed Energy Systems Symposium*, Portsmouth, VA, September 2018. [CDE]

Shelters, B., S.T. Fiorino, B. Elmore, J. Bills, J. Schmidt, and M. Husk, "Attenuation Statistics Derivation in the V&W Bands Using 4D Weather Cubes," *13th Annual Directed Energy Systems Symposium*, Portsmouth, VA, September 2018. [CDE]

McCrae, J., S.T. Fiorino, and S. Bose-Pillai, "Profiling Atmospheric Turbulence with Moon Imagery," *13th Annual Directed Energy Systems Symposium*, Portsmouth, VA, September 2018. [CDE]

Bose-Pillai, S.R., J. McCrae, C. Rice, and S.T. Fiorino, "First Look at Profiling Atmospheric Turbulence along a Path using the Hartmann Turbulence Sensor," *13th Annual Directed Energy Systems Symposium*, Portsmouth, VA, September 2018. [CDE]

Marquet, L., S. Hammel, and S.T. Fiorino, "Propagation Path Characterization System (PCS) for LWS Support," *13th Annual Directed Energy Systems Symposium*, Portsmouth, VA, September 2018. [CDE]

Wolfmeyer, S., G. Thomas, and S.T. Fiorino, "Coupled Surface Observations of Temperature, Pressure, and Humidity with Surface Aerosol Particle Counts for Daytime Sky Radiance Quantification," *2018 Atmospheric Transmission Models-Modeling in Remote Sensing Meeting*, Newton, MA, 5 June 2018. [CDE]

Thomas, G., R. Cobb, S.T. Fiorino, and M. Hawks, "Daytime Sky Radiance Model Validation of GEO-belt in NIR-SWIR," *2018 Atmospheric Transmission Models-Modeling in Remote Sensing Meeting*, Newton, MA, 5 June 2018. [CDE] [CSRA]

- Fiorino, S.T., K. Keefer, C. Rice, J. Burley, and J. Schmidt, "Characterizing Multispectral Vertical Profiles of Aerosol Extinction with Surface-based Measurements," *Directed Energy Professional Society 20th Annual DE Science and Technology Symposium*, Oxnard, CA (February 2018). [CDE]
- Fiorino, S.T., and J.E. McCrae, "Use of a Fast Scaling Law Model to Determine Optimal Array Configuration for Incoherent or Coherent Beam Combination," *Directed Energy Professional Society 20th Annual DE Science and Technology Symposium*, Oxnard, CA (February 2018). [CDE]
- Fiorino, S.T., K. Keefer, J.E. McCrae, S.R. Bose-Pillai, "Advantages of Quantifying Velocity Structure Function, C_v2 to Infer Refractive Structure Function, C_n2 ," *Directed Energy Professional Society 20th Annual DE Science and Technology Symposium*, Oxnard, CA (February 2018). [CDE]
- Bose-Pillai, S.R., J.E. McCrae, C.A. Rice, and S.T. Fiorino, "Characterizing atmospheric turbulence over long paths using time-lapse imagery," *Directed Energy Professional Society 20th Annual DE Science and Technology Symposium*, Oxnard, CA (February 2018). [CDE]
- Santasri R. Bose-Pillai, Jack E. McCrae, Ryan A. Wood, Connor E. Murphy, Christopher A. Rice, and Steven T. Fiorino, "Characterizing atmospheric turbulence over long paths using time-lapse imagery," *Proc. SPIE* 10650, Long-Range Imaging III, 106500A (11 May 2018). [CDE]
- McCrae, J.E., S.R. Bose-Pillai, C.A. Rice, and S.T. Fiorino, "Analysis of Tilt Removed Hartmann Turbulence Sensor Data," *Directed Energy Professional Society 20th Annual DE Science and Technology Symposium*, Oxnard, CA (February 2018). [CDE]
- Fiorino, S.T., K.J. Keefer, C.A. Rice, J.L. Burley, and J. Schmidt, "Characterizing Multispectral Vertical Profiles of Aerosol Extinction with Surface-Based Measurements," *22nd Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface (IOAS-AOLS)*, 98th Annual American Meteorological Society Meeting, Austin, TX, Jan 2018. (Poster and webposting: <https://ams.confex.com/ams/98Annual/webprogram/Paper335342.html>). [CDE]
- Burley, J.L., Fiorino, S.T., B.J. Elmore, and J. Schmidt, "A Remote Sensing and Atmospheric Compensation Tool for Assessing Multi-Spectral Radiative Transfer Properties through Realistic Atmospheres and Clouds," *22nd Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface (IOAS-AOLS)*, 98th Annual American Meteorological Society Meeting, Austin, TX, Jan 2018. (Poster and webposting: <https://ams.confex.com/ams/98Annual/webprogram/Paper336039.html>). [CDE]
- Jack E. McCrae, Santasri R. Bose-Pillai, Christopher A. Rice, and Steven T. Fiorino, "Global tilt removal on a Hartmann turbulence sensor," *Proc. SPIE* 10770, Laser Communication and Propagation through the Atmosphere and Oceans VII, 107700V (18 Sep 2018).
- Santasri R. Bose-Pillai, Jack E. McCrae, Matthew D. Wilson, Andrew L. Back, Christopher A. Rice, and Steven T. Fiorino, "Profiling of atmospheric turbulence along a path using two beacons and a Hartmann turbulence sensor," *Proc. SPIE* 10772, Unconventional and Indirect Imaging, Image Reconstruction, and Wavefront Sensing 2018, 107720C (18 Sep 2018).

BOOKS AND CHAPTERS IN BOOKS

- Schmidt J., J. Burley, B. Elmore, S. Fiorino, K. Keefer, and N. Van Zandt, 2018: "4D Weather Cubes and defense applications." *Defense Innovation Handbook*. Badiru & Barlow eds, CRC press, Chapter 14, pp. 432. [CDE]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

- Bose-Pillai, S. R., J.E. McCrae, C.A. Rice, R.A. Wood, C.E. Murphy, and S.T. Fiorino, "Estimation of atmospheric turbulence using differential motion of extended features in time-lapse imagery," accepted *Opt. Eng.* [CDE]

Burley, J.L., S.T. Fiorino, B. Elmore, and J. Schmidt, "A Remote Sensing and Atmospheric Correction Tool for Assessing Multi-Spectral Radiative Transfer through Realistic Atmospheres and Clouds" early online release JTECH. <https://doi.org/10.1175/JTECH-D-18-0078.1>. [CDE]

FRANZ, ANTHONY L., Lt Col,

Assistant Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 2012 (AFIT/ENP); BS, United States Air Force Academy, 1992; MS, Air Force Institute of Technology, 1997; PhD, University of Maryland, 2007. Lt Col Franz's research focuses on lasers and optics. His recent work has focused on developing light weight diffractive optics for use on satellites and novel approaches for imaging and hyperspectral imaging systems. Before joining AFIT, he was a physics faculty member at the Air Force Academy for eight years and deployed to Iraq and Afghanistan. He has also worked in nuclear treaty monitoring and infrared missile engagement modeling and simulation. Lt Col Franz is a member of the American Association of Physics Teachers (AAPT), the American Physical Society (APS), the International Society for Optics and Photonics (SPIE), and the Optical Society of America (OSA). AFIT research center affiliation(s): CTISR. Tel. 937-255-3636 x4429, email: Anthony.Franz@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Anthony L. Franz, Jack A. Shepherd, Carlos D. Diaz, "Figures of merit for the optical performance of Fresnel zone light field spectral imagers (Conference Presentation)," *Proc. SPIE* 10644, Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery XXIV, 106440M (14 May 2018); doi:10.1117/12.2303897; <https://doi.org/10.1117/12.2303897>.

Carlos Diaz, Anthony L. Franz, Jack A. Shepherd, "Modification of Fresnel zone light field spectral imaging system for higher resolution (Conference Presentation)," *Proc. SPIE* 10644, Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery XXIV, 106441C (14 May 2018); doi:10.1117/12.2303898; <https://doi.org/10.1117/12.2303898>.

Jack A. Shepherd, Anthony L. Franz, "Evaluation of plenoptic algorithm performance for measuring scene spectra captured by a diffractive plenoptic camera," *Proc. SPIE* 10669, Computational Imaging III, 1066909 (14 May 2018); doi:10.1117/12.2303894; <https://doi.org/10.1117/12.2303894>.

GILES, NANCY C.,

Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 2009 (AFIT/ENP); BS, University of North Carolina at Chapel Hill, 1981; PhD, North Carolina State University, 1987. Dr. Giles' research focuses on solid-state physics: photoluminescence (PL), absorption, Raman, and magnetic resonance (EPR) spectroscopy leading to identification of point defects in semiconducting and optical materials; PL excitation and time-resolved PL spectroscopies; nonlinear optical materials; laser-host materials; and scintillators. She is the author of 196 archival publications in refereed journals and two book chapters. Before joining AFIT, she was a physics faculty member at West Virginia University for 19 years. She has more than 5040 total career citations of her papers; her h-index is 36. Current work includes studies of dosimeter materials for improved detection of nuclear radiation, wide band-gap semiconductors for photorefractive and electronic device applications, and infrared non-linear optical materials for infrared countermeasures. Dr. Giles is a member of the Optical Society of America, American Physical Society, and Materials Research Society. Tel. 937-255-3636 x4601, email: Nancy.Giles@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Characterization of Point Defects in Semiconducting Oxide Crystals." Sponsor: AFOSR. Funding: \$11,220.

"Performance-Modifying Defects in Birefringent and Photorefractive Crystals." Sponsor: AFOSR. Funding: \$10,120.

"Next Generation Nonlinear Crystals for High Power Lasers Years 2,3 (Follow-on) to Proposal #2016-221." Sponsor: AFRL/RD. Funding: \$50,000.

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- E. M. Scherrer, L. E. Halliburton, E. M. Golden, K. T. Zawilski, P. G. Schunemann, F. K. Hopkins, K. L. Averett, and N. C. Giles, "Electron paramagnetic resonance and optical absorption study of acceptors in CdSiP₂ crystals," *AIP Advances*, Vol. 8, Article No. 095014 (Sept 2018).
- B. E. Kananen, J. W. McClory, N. C. Giles, and L. E. Halliburton, "Copper-doped lithium triborate (LiB₃O₅) crystals: A photoluminescence, thermoluminescence, and electron paramagnetic resonance study," *Journal of Luminescence*, Vol. 194, pp. 700-705 (Feb 2018).
- B. E. Kananen, L. E. Halliburton, G.K. Foundos, K. B. Chang, and K. T. Stevens, "Self-trapped holes in β -Ga₂O₃ crystals," *Journal of Applied Physics*, Vol. 122, Article No. 215703 (6 pages) (Dec 2017).

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- C.M. Liebig, F.K. Hopkins, K.L. Averett, K.T. Zawilski, P.G. Schunemann, E.M. Scherrer, N.C. Giles, and L.E. Halliburton, "Status of CdSiP₂ Development for Scaling Mid-Infrared Laser Power," Laser Technology for Defense and Security XIV, *Proc. of SPIE* Vol. 10637, Paper No. 106370U (May 2018).

GROSS, KEVIN C.,

Director, Center for Technical Intelligence Studies & Research, and Associate Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 2008 (AFIT/ENP); BS, Wright State University, 1998; MS, Wright State University, 2001; PhD, Air Force Institute of Technology, 2007. Dr. Gross' main interests are remote sensing, spectroscopy, and radiative transfer, and his research is focused on the remote sensing of chemically evolving systems in the battlespace (detonation fireballs, muzzle flashes, rocket and jet engine plumes, smokestack effluents, etc.) using hyperspectral, radiometric and high-speed imagery techniques. He is developing hyperspectral imaging and spectral retrieval algorithms for quantitative combustion and flow field diagnostics. He is also leading a new effort to develop polarimetric hyperspectral imaging for improved target detection and robust material identification. He has 28 archival publications in peer reviewed journals and has secured over \$4M in external funding. He has successfully chaired 10 MS students, four PhD student, and is currently advising two PhD students and two MS students. He is a member of the Optical Society of America (OSA), SPIE, and the Combustion Institute. AFIT research center affiliation(s): CDE, CSRA, and CTISR. Tel. 937-255-3636 x4558, email: Kevin.Gross@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

- "Remote Sensing Research Support ((RS)²)." Sponsor: Undisclosed. Funding: \$356,887 – Gross 4%, Oxley 24%, Steward 24%, Hopkinson 24%. [CTISR]
- "Open Skies IR Target Study." Sponsor: NASIC. Funding: \$150,000 – Gross 5%, Hawks 75%, Marciniak 10%, Franz 10%. [CTISR]
- "Infrared Hyperspectral Imaging for Optical Temperature Measurement of Targets (Mod 3)." Sponsor: MDA (Spectral Sciences). Funding: \$29,000. [CTISR]
- "Algorithm Development for WFOV Mission Data Processing (Phase 2 SBIR)." Sponsor: AFRL/RV (Etegent). Funding: \$60,000 – Gross 20%, Steward 40%, Hawks 40%. [CTISR]

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HAWKS, MICHAEL R.,

Research Assistant Professor of Optical Engineering (through Perduco), Department of Engineering Physics, AFIT Appointment Date: 2008 (AFIT/ENP); BS, Astrophysics, Michigan State University, 1991; MS, Engineering Physics, AFIT, 1993; PhD, Optical Sciences, AFIT, 2006. Dr. Hawks' main research interests include electro-optic and infrared (EO/IR) remote sensing. Specific application areas include monocular passive ranging, hyperspectral and polarimetric imaging, and computational imaging. He previously taught at the United States Air Force Academy and has conducted research in chemical lasers, space object identification, chem/bio agent detection, infrared countermeasures, nuclear detonation detection, and other remote sensing applications at the Air Force Research Laboratory and other assignments. He has received 12 research grants, chaired nine MS committees and published 36 technical papers and reports. He is a member of the Optical Society of America and SPIE and is a retired USAF Lt Col. AFIT research center affiliation(s): CDE, CSRA, and CTISR. Tel. 937-255-3636 x4828, email: Michael.Hawks.ctr@afit.edu

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A. Gavrialesdes, L.A. Schlie, R.D. Loper, M.R. Hawks, G.P. Perram, "Analytic treatment of beam quality and power efficiency in high power transverse flow Diode Pumped Alkali Laser," J. Opt. Soc. Am. B, Vol. 35(9), pp. 2202-2210 (2018). [CTISR]

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HENGHELD, ROBERT L.,

Professor Emeritus of Physics, Department of Engineering Physics, AFIT Appointment Date: 1961 (AFIT/ENP); AB, Thomas More College, 1956; MS, University of Cincinnati, 1961; PhD, University of Cincinnati, 1965. Dr. Hengehold's research areas center on experimental solid state physics, semiconductor physics, optical diagnostics, and electron and laser spectroscopy. He is the author of over 100 archival publications and over 215 presentations at technical meetings. He has served as advisor on over 17 doctoral dissertations and 80 master's theses. He is currently carrying out studies of (1) depth resolved cathodoluminescent spectroscopy of materials suitable for neutron absorbing semiconductor solid state detectors and (2) optical characterization of compound semiconductor materials and superlattice structures for mid-infrared diode lasers and detectors. This work involves collaborative efforts with the Directed Energy and Sensors Directorates at AFRL and DTRA. Dr. Hengehold received the Air University Commander's Award for Faculty Achievement in 1982, the Gage H. Crocker Outstanding Professor Award in 1996, the Outstanding Professional Achievement Award from the Affiliate Society Council of the Engineering and Science Foundation of Dayton in 1997, and the General Bernard A. Schriever Award in 1999. He was elected a Fellow of the American Physical Society in 2008. Tel. 937-255-3636 x4502, email: Robert.Hengehold@afit.edu

HERR, NICHOLAS, C., Maj,

Assistant Professor of Materials Science, Department of Engineering Physics, AFIT, Appointment Date: 2016 (AFIT/ENP); BS, United States Air Force Academy, 2008; MS, Air Force Institute of Technology, 2010; PhD, Air Force, 2016. Maj Herr's research focuses on high-power laser damage of carbon composites, remote sensing, and atomic force microscopy. Tel. 937-255-3636 x4524, email: Nicholas.Herr@afit.edu

REFEREED JOURNAL PUBLICATIONS

Nicholas C. Herr, Ashley E. Gonzales, Glen P. Perram, “Kinetics, evolving thermal properties, and surface ignition of carbon fiber reinforced epoxy composite during laser-induced decomposition,” *Polymer Degradation and Stability*, 152, June 2018.

Ashley E. Gonzales, Nicholas C. Herr, Glen P. Perram, “Experimental study of laser irradiated graphite oxidation using IFTS,” *Combustion and Flame*, 192, June 2018.

HOBBS, EDWARD L., LTC

Assistant Professor of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 2018 (AFIT/ENP); LTC Hobbs’ research interests are primarily focused on deterministic neutron transport. Most recently he developed methods to address the difficulties of the non-linear characteristics associated with the time-eigenvalue diffusion and even-parity transport equations. His calculations currently provide the time-eigenvalue used to model the burst characteristics associated with a Fast Burst Reactor (FBR). Additional research interests include non-proliferation, counter-proliferation, and consequence management, specifically as they relate to the military and Nuclear and Counter-Proliferation Officer (NCP/52) missions. LTC Hobbs is also interested in improved methods to determine accurate nuclear data (material), stochastic transport methods, and health physics (radiation safety). Tel. 937-255-3636 X4609, email: Edward.Hobbs@afit.edu

HOGSED, MICHAEL R., Lt Col,

Assistant Professor of Engineering Physics, Department of Engineering Physics, AFIT Appointment Date: 2015 (AFIT/ENP); BS, Baylor University, 1997; MS, Oklahoma State University, 1999; PhD, Air Force Institute of Technology, 2005. Lt Col Hogsed’s research focuses on semiconductor device characterization and radiation effects on advanced microelectronic materials and devices. He has published three refereed journal articles. Currently under investigation are materials in the germanium-silicon-tin system ($\text{Ge}_{1-x-y}\text{Si}_x\text{Sn}_y$) for photonic applications. Other research includes radiation hardness assurance testing of novel electronic components and COTS microprocessors. Lt Col Hogsed also has 10 years’ experience in the Air Force nuclear enterprise as an analyst and S&T manager for a variety of nuclear matters, to include treaty monitoring, weapon employment planning factors, and counterproliferation intelligence. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4547, email: Michael.Hogsed@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Investigation of the Optical and Electrical Properties of Optoelectronic Materials and Devices in the Ge-Si-Sn System.” Sponsor: AFOSR. Funding: \$62,500.

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OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Sponsored Technical Reports: “Attenuation of thermal neutrons using boron nitride nanotube/polyurethane composite shielding material,” AFIT/ENP, 6 Sep 2018.

“Total ionizing dose effects in NVIDIA Jetson TX2I modules,” AFIT/ENP, 10 Sep 2018. [CSRA]

HOLLAND, DARREN, E.

Research Assistant Professor of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 2018 (AFIT/ENP); BA, Cedarville University, 2006; MS, University of Michigan, 2008; PhD, University of Michigan, 2012. Dr. Holland’s expertise is in optimization and radiation transport. His current research focuses on optimizing a gamma and neutron rotating scatter mask for source location identification and imaging. Before joining AFIT, he was on the faculty of Cedarville University. Dr. Holland is a member of the American Society of Mechanical Engineers (ASME). Tel. 937-255-3636 x4697, email: Darren.Holland.ctr@afit.edu

REFEREED JOURNAL PUBLICATIONS

Holland, D. E., Bevins, J. E., Burggraf, L. W., and O'Day, B. E., 2018. "Rotating scatter mask optimization for gamma source direction identification." *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, Vol 901, pp. 104-111.
<https://doi.org/10.1016/j.nima.2018.05.037>

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LEWIS, DOUGLAS R., LTC,

Assistant Professor of Biodefense Science, Department of Engineering Physics, AFIT Appointment Date: 2012 (AFIT/ENP); BS, Biology, USAF Academy 1991; MS, Genetics, Pennsylvania State University 1995; PhD, Biodefense, George Mason University 2012. LTC Lewis' previous research focused on genetic components of the insect immune system, genetic response to laser induced damage, peptide capture of biological agents, genetic identification of smallpox, and the organizational factors which have influenced the development of the US Biodefense program. Before joining AFIT, he served 16 years in the US Air Force and five years in the US Army to include assignments as an aircraft maintenance officer and as an Assistant Professor of Biology at the Air Force Academy. He also served in counter-WMD positions with the Defense Intelligence Agency (DIA), Air Staff, as an US/UK exchange scientist and with the Defense Threat Reduction Agency (DTRA). LTC Lewis' current research is investigating the genetic components of extreme radiation resistance in bacteria. His other interest is investigating the possibility of developing a biological collection network based upon native collection entities. Tel. 937-255-3636 x4569, email: Douglas.Lewis@afit.edu

LOPER, ROBERT D.,

Assistant Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 2014 (AFIT/ENP); BS, University of Dayton, 1994; MS, University of Texas at Dallas, 1998; MTS, United Theological Seminary, 2011; PhD, Air Force Institute of Technology, 2013. Dr. Loper's research interests are in space physics, centering on solar astrophysics, magnetospheric physics, and the near-Earth space environment. Dr. Loper is a member of Tau Beta Pi and Sigma Pi Sigma. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4333, email: Robert.Loper@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Heavy Ion to Proton Fluence Ratios in Solar Energetic Particle Events and Effects on Spacecraft Anomalies."
Sponsor: AFRL/RV. Funding: \$18,000. [CSRA]

REFEREED JOURNAL PUBLICATIONS

Gavrielides, Athanasios, L.A. (Vern) Schlie, Robert D. Loper, Michael R. Hawks, and Glen P. Perram (2018), "Analytic treatment of beam quality and power efficiency in a high-power transverse flow diode pumped alkali laser," *J. Opt. Soc. Am. B*. Vol. 35, Issue 9, pp. 2202-2210; doi:10.1364/JOSAB.35.002202.

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Tseng, H.R., O.A. Nava, C.D. Lewis, R.D. Loper, and R.C. Tournay, "Environmental Modeling and Characterization of the Hypersonic Vehicle Operations Space," *2018 Hypersonic Science & Technology Conference* (2018)

Gavrielides, Anthony, Vern Schlie, Robert Loper, Michael Hawks, and Glen Perram, "Analytic treatment of high power diode pumped lasers with unstable resonator in a flowing medium," *Proc. SPIE 10518, Laser Resonators, Microresonators, and Beam Control XX*, 1051815 (16 February 2018); doi:10.1117/12.2290510.

Smith, Nathan D., Robert D. Loper, and Omar A. Nava, "Mid-latitude Plasma Irregularities During Subauroral Polarization Streams," *American Geophysical Union 2017 Fall Meeting* (2017)

LUTZ, JESSE J.,

Research Assistant Professor, Department of Engineering Physics, AFIT Appointment Date: 2015 (AFIT/ENP); BS, Chemistry, Grand Valley State University, 2006; PhD, Physical Chemistry, Michigan State University, 2011. Dr. Lutz's research focuses on characterization of the structure and spectral signatures of nanoscale silicon carbide clusters, modeling relativistic and finite-nucleus effects in molecules containing heavy atoms, and development of ab initio many-body electronic structure methods for the accurate prediction of energies and properties of atomic and molecular systems. Tel. 937-255-3636 x4241, email: Jesse.Lutz.ctr@afit.edu

REFEREED JOURNAL PUBLICATIONS

J. J. Lutz, Xiaofeng Duan, Duminda S. Ranasinghe, Yifan Jin, Johannes T. Margraff, Ajith Perera, Larry W. Burggraf, and Rodney J. Bartlett, "Valence and charge-transfer optical properties for some SinCm (m, n ≤ 12) clusters: Comparing TD-DFT, complete-basis-limit EOMCC, and benchmarks from spectroscopy." *Journal of Chemical Physics*, Vol. 148, Issue 17, May 2018. doi:10.1063/1.5022701

J. J. Lutz, Marcel Nooijen, Ajith Perera, and Rodney J. Bartlett, "Reference dependence of the two-determinant coupled-cluster method for triplet and open-shell singlet states of biradical molecules." *Journal of Chemical Physics*, Vol. 148, Issue 16, April 2018. doi:10.1063/1.5025170

J. J. Lutz, X. F. Duan, and L. W. Burggraf, "Semiconductor color-center structure and excitation spectra: Equation-of-motion coupled-cluster description of vacancy and transition-metal defect photoluminescence," *Phys. Rev. B*, Vol. 97, 115108, March 2018. doi:10.1103/PhysRevB.97.115108

J. Margraf, A. Perera, J. J. Lutz, and R. J. Bartlett, "Single-reference coupled-cluster theory for multi-reference problems," *J. Chem. Phys.*, Vol. 147, 184101, November 2017. doi:10.1063/1.5003128

MARCINIAK, MICHAEL A.,

Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 1999 (AFIT/ENP); BS, St. Joseph's College, 1981; BSEE, University of Missouri, 1983; MSEE, Air Force Institute of Technology, 1987; PhD, Air Force Institute of Technology, 1995. Dr. Marciniak's research interests include various aspects of light-matter interaction, including (1) polarimetric scatterometry of nanostructured materials, such as photonic crystals, plasmonic materials, and optical meta-materials; (2) bidirectional reflectance distributions for optical signatures; and (3) high-energy laser damage assessment. He has published 30 refereed and 73 other publications and chaired 9 PhD and 52 MS thesis committees. He holds one patent. He is a retired Lt Col, USAF, with 22 years of service. AFIT research center affiliation(s): CDE, CSRA, and CTISR. Tel. 937-255-3636 x4529, email: Michael.Marciniak@afit.edu

SPONSOR FUNDED RESEARCH PROJECT

"Spectral, Polarimetric and Directionally Dependent Metrology of Infrared Metamaterials." Sponsor: Undisclosed. Funding: \$62,150. [CTISR]

"Discontinuous Phase Surfaces for Low-Profile Infrared Optics." Sponsor: AFOSR. Funding: \$60,900. [CDE]

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- B.E. Ewing, S.D. Butler and M.A. Marciniak, "Improved grazing angle BRDF model using Rayleigh-Rice polarization factor and adaptive microfacet distribution function," *Optical Engineering* 57(10), 105102(1-9) (2018).
- M. Paulec, M. Marciniak, K. Gross, B. Akers and D. Azevedo, "Tomographic reconstruction of a jet engine exhaust plume using an infrared hyperspectral imager," *Optical Engineering* 57(10), 103103(1-12) (2018). [CTISR]
- G.E. Lott, M.A. Marciniak and J.H. Burke, "Three Dimensional Imaging of Trapped Cold Atoms with a Light Field Microscope," *Applied Optics* Vol. 56, No. 31, pp. 8738-8745 (Oct 2017).
- J.C. Vap, S.E. Nauyoks, M.R. Benson and M.A. Marciniak, "Use of a novel infrared wavelength-tunable Mueller-matrix polarimetric scatterometer to measure nanostructured optical materials," *Review of Scientific Instruments* Vol. 88, pp. 103104(1-6) (Oct 2017).

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

- M. Paulec, M.A. Marciniak, K. Gross, and D. Azevedo, "Infrared signature measurements of a jet turbine using a hyperspectral imager for combustion diagnostics," Proc. SPIE 10644, 10644-32 (2018). [CTISR]
- B.M. Adomanis, and M.A. Marciniak, "Sensitivities of large-aperture plasmonic metasurface lenses in the long-wave infrared," Proc. SPIE 10542, 10542-35 (2018).
- B.M. Adomanis, D.B. Burckel and M.A. Marciniak, "COMSOL Multiphysics® implementation of a genetic algorithm routine for meta-surface optimization," https://www.comsol.com/paper/download/438502/adomanis_paper.pdf (best poster recipient)

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

- B.M. Adomanis, D.B. Burckel and M.A. Marciniak, "Plasmonic Huygens' sources as 3D building blocks for highly-efficient metasurface optics," presented at SPIE Optics & Photonics 2018 (OP101-34) held on 19-23 August 2018 in San Diego, CA.
- A. Lanari, S.D. Butler, M.A. Marciniak and B. Ewing, "Polarimetric evaluation of oblique and grazing angle microfacet BRDF model modification using experimental data," presented at SPIE Optics & Photonics 2018 (OP313-18) held on 19-23 August 2018 in San Diego, CA.

MATHEWS, KIRK A.,

Professor Emeritus of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 1987 (AFIT/ENP); BS, California Institute of Technology, 1971; MS, Air Force Institute of Technology, 1982; PhD, Air Force Institute of Technology, 1983. Dr. Mathews' research interests center on computational methods for neutral particle radiation transport and modeling and analysis of nuclear phenomena and measurements, including enrichment cascade modeling, high altitude radiation transport, blast and shock, nuclear thermal radiation, deconvolution of radiation spectra, and statistical analysis of nuclear measurements. Dr. Mathews has published 20 papers in refereed journals and 21 conference proceedings and chaired 35 theses and 13 dissertations. He is a member of the American Nuclear Society and Tau Beta Pi.

MCCLORY, JOHN W.,

Associate Professor of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 2008 (AFIT/ENP); BS, Physics, Rensselaer Polytechnic Institute, 1984; MS, Physics, Texas A&M University, 1993; PhD, Nuclear Engineering, Air Force Institute of Technology, 2008. Dr. McClory's expertise is in radiation effects, radiation detector development, and nuclear weapon effects. His research includes determining the effect of space and nuclear weapon radiation on electronic and structural materials, the interaction of radiation with matter, and the use of nuclear reactions to inform nuclear forensics techniques. He has advised 14 PhD students (five current) and 33 MS students, received 17 research grants, and published 81 journal articles during his time on the AFIT faculty. He is a

member of the IEEE Nuclear and Plasma Sciences Society, American Nuclear Society, and Materials Research Society. AFIT research center affiliation(s): CSRA and CTISR. Tel. 937-255-3636 x7308, email: John.McClory@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“AFIT/ENP Research In Support Of Defense Threat Reduction Agency Nuclear Technologies.” Sponsor: DTRA. Funding: \$100,000 – McClory 30%, Dexter 35%, Bevins 35%.

“Support for the US Nuclear Detonation Detection System.” Sponsor: DOE/NNSA. Funding: \$50,000.

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Michael A. Ford, Buckley E. O’Day, John W. McClory, Manish K. Sharma, Areg Danagoulia, “Evaluation of Eu:LiCAF for neutron detection utilizing SiPMs and portable electronics,” *Nuclear Instruments and Methods in Physics Research A*, Vol. 908, pp. 110-116, 2018. <https://doi.org/10.1016/j.nima.2018.08.016>

W.J. Erwin, E. Cazalas, J.W. McClory, A.W. Decker, “Development of Radiation Protection Factors with Gamma and Neutron Spectroscopy Using a Plutonium-Beryllium Source,” *Journal of Radiation Effects, Research and Engineering*, Vol. 36, No. 1, pp. 88-93, April 2018.

A.W. Decker, S.A. Heider, M. Millett, S.R. McHale, J.A. Clinton, J.W. McClory, “Verification and Validation of MCNP6.1 Neutron Protection Factor Estimates of an Armored Vehicle Surrogate Using the White Sands Missile Range Fast Burst Reactor,” *Journal of Radiation Effects, Research and Engineering*, Vol. 36, No. 1, pp. 65-70, April 2018.

B. E. Kananen, J. W. McClory, N. C. Giles and L. E. Halliburton, “Copper-doped lithium triborate (LiB₃O₅) crystals: A photoluminescence, thermoluminescence, and electron paramagnetic resonance study,” *Journal of Luminescence*, Vol. 194, pp. 700-705, February 2018. <http://dx.doi.org/10.1016/j.jlumin.2017.09.039>

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B. D. Campbell, J. W. McClory, J. A. Clinton, B. Barber, G. Hansen “Integration of Protection for Multiple Threats in Composite Materials,” presented at the *2018 Hardened Electronics and Radiation Technology Conference* in Tucson, AZ on 19 April 2018.

Matthew C. Recker, Edward Cazalas, and John W McClory, “Pulse shape discrimination with a low-cost digitizer using commercial off-the-shelf components,” presented at the *2018 Symposium on Radiation Measurement and Analysis* in Ann Arbor, MI on 14 June 2018.

Michael A. Ford, Buckley E. O’Day, John W. McClory, and Areg Danagoulia, “Evaluation of LiCAF for Neutron Spectroscopy using SiPMs and Portable Electronics,” presented at the *2018 Symposium on Radiation Measurement and Analysis* in Ann Arbor, MI on 13 June 2018.

J. R. Stickney, J. E. Bevins, E. Cazalas, and J. W. McClory, “Pulse Height Spectra Analysis of a Neutron Energy Tuning Assembly,” presented at the *2018 Symposium on Radiation Measurement and Analysis* in Ann Arbor, MI on 12 June 2018.

E. Cazalas, M. R. Hogsed, S. Vangala, M. R. Snure, J. W. McClory, “Gamma Radiation Effects in Graphene Field Effect Transistors with h-BN Thin Film Substrates,” for presentation at the *2018 IEEE Nuclear and Space Radiation Effects Conference* in Kona, HI on 18 July 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

T. W. Warren, D. A. Matters, A. M. Hurst, L. Szentmiklósi, J. J. Carroll, J. W. McClory, T. Belgia, “Neutron Prompt Gamma Activation Analysis of ^{188}Re ,” presented at the *April 2018 Meeting of the American Physical Society* in Columbus, OH on 14 April 2018.

T. W. Warren, J. W. McClory, G. J. Lane, C. J. Chiara, J. J. Carroll, “Gamma Coincidence Measurements of ^{192}Ir from Charged-Particle Reactions,” presented at the *April 2018 Meeting of the American Physical Society* in Columbus, OH on 16 April 2018.

MCCRAE, JACK E., Jr.,

Research Assistant Professor, Department of Engineering Physics, AFIT Appointment Date: 2013 (AFIT/ENP); BS, Physics, Massachusetts Institute of Technology, 1984; MS, Physics (Optics), Air Force Institute of Technology, 1993; PhD, Physics, Air Force Institute of Technology, 1997. Dr. McCrae’s research interests include optics, lasers, quantum and non-linear optics, quantum computing, laser radar, atmospheric propagation, and imaging. He is a retired USAF Col with 27 years of service. AFIT research center affiliation(s): CDE. Tel. 937-255-3636 x4739, email: Jack.Mccrae@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Novel Characterization Measurements and Meteorological-Driven Modeling of Turbulence and Refraction in the Lower Atmosphere for Directed Energy Applications.” Sponsor: DEJTO. Funding: \$560,000 – McCrae 80%, Fiorino 20%. [CDE]

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Bose-Pillai, S. R., J.E. McCrae, C.A. Rice, R.A. Wood, C.E. Murphy, and S.T. Fiorino, “Estimation of atmospheric turbulence using differential motion of extended features in time-lapse imagery,” *Optical Engineering*, vol. 57, no.10, 104108 (14pp.), 2018, doi: 10.1117/1.OE.57.10.104108. [CDE]

Van Zandt, N. R., J. E. McCrae, M. F. Spencer, M. J. Steinbock, M. W. Hyde, and S. T. Fiorino, “Polychromatic wave-optics models for image-plane speckle. 1. Well-resolved objects,” *Appl. Opt.* Vol. 57, pp. 4090-4102 (2018) [CDE]

Hyde IV, M. W., J E. McCrae, and G. A. Tyler, “Target-based coherent beam combining of an optical phased array fed by a broadband laser source,” *Journal of Modern Optics*, Vol. 64, Issue 20, 2017. doi:10.1080/09500340.2017.1343403 [CDE]

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Sukanta Basu, Santasri Bose-Pillai, Steven Fiorino, and Jack McCrae, “Evaluating a Coupled Mesoscale Modeling and Ray Tracing Framework over an Urban Area,” in *Propagation Through and Characterization of Atmospheric and Oceanic Phenomena, OSA Technical Digest (online) (OSA, 2018)*, paper PW3H.3. [CDE]

Jack E. McCrae, Santasri R. Bose-Pillai, Steven T. Fiorino, and Milo W. Hyde IV, “Improved Filtering of Source Plane Tilts for Optical Propagation Simulations,” *2018 IEEE Aerospace Conference*, Big Sky, MT, 3-10 Mar 2018. [CDE]

Jack E. McCrae, Connor E. Murphy*, Santasri R. Bose-Pillai, Christopher A. Rice, and Steven T. Fiorino, “The Influence of Wind on Anisotropy in Optical Turbulence,” *2018 IEEE Aerospace Conference*, Big Sky, MT, 3-10 Mar 2018. [CDE]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

- J. McCrae, S.T. Fiorino, and S. Bose-Pillai, "Profiling Atmospheric Turbulence with Moon Imagery," *13th Annual Directed Energy Systems Symposium*, Portsmouth, VA, September 2018. [CDE]
- S. R. Bose-Pillai, J. McCrae, C. Rice, and S.T. Fiorino, "First Look at Profiling Atmospheric Turbulence along a Path using the Hartmann Turbulence Sensor," *13th Annual Directed Energy Systems Symposium*, Portsmouth, VA, September 2018. [CDE]
- Jack E. McCrae, Santasri R. Bose-Pillai, Christopher A. Rice, and Steven T. Fiorino, "Global tilt removal on a Hartmann turbulence sensor," *Proc. SPIE 10770, Laser Communication and Propagation through the Atmosphere and Oceans VII*, 107700V (18 Sep 2018). [CDE]
- Santasri R. Bose-Pillai, Jack E. McCrae, Matthew D. Wilson, Andrew L. Back, Christopher A. Rice, and Steven T. Fiorino, "Profiling of atmospheric turbulence along a path using two beacons and a Hartmann turbulence sensor," *Proc. SPIE 10772, Unconventional and Indirect Imaging, Image Reconstruction, and Wavefront Sensing 2018*, 107720C (18 Sep 2018). [CDE]
- Santasri R. Bose-Pillai, Jack E. McCrae, Ryan A. Wood, Connor E. Murphy, Christopher A. Rice, and Steven T. Fiorino, "Characterizing atmospheric turbulence over long paths using time-lapse imagery," *Proc. SPIE 10650, Long-Range Imaging III*, 106500A (11 May 2018). [CDE]
- Santasri Bose-Pillai, Jack McCrae, Christopher Rice, and Steven Fiorino, "Characterizing atmospheric turbulence over long paths using time-lapse imagery," *20th Annual DEPS S+T Symposium*, Oxnard, CA, 26 Feb – 02 Mar, 2018. [CDE]
- Fiorino, S.T., and J.E. McCrae, "Use of a Fast Scaling Law Model to Determine Optimal Array Configuration for Incoherent or Coherent Beam Combination," *Directed Energy Professional Society 20th Annual DE Science and Technology Symposium*, Oxnard, CA (February 2018). [CDE]
- Jack McCrae, Santasri Bose-Pillai, Christopher Rice, and Steven Fiorino, "Analysis of Tilt Removed Hartmann Turbulence Sensor Data," *20th Annual DEPS S+T Symposium*, Oxnard, CA, 26 Feb – 02 Mar, 2018. [CDE]
- Steven Fiorino, Kevin Keefer, Jack McCrae, and Santasri Bose-Pillai, "Advantages of Quantifying Velocity Structure Function, C_v2 to Infer Refractive Structure Function, C_n2 ," *20th Annual DEPS S+T Symposium*, Oxnard, CA, 26 Feb – 02 Mar, 2018. [CDE]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Participated in a joint atmospheric characterization field campaign with AFRL/RYM in April, 2018.

NAVA, OMAR A., Maj,

Assistant Professor of Atmospheric Science, Department of Engineering Physics, AFIT Appointment Date: 2016 (AFIT/ENP); BS, United States Air Force Academy, 2005; BS, Naval Postgraduate School, 2006; MS, Southern Methodist University, 2010; MS, Air Force Institute of Technology, 2011; PhD, University of California Los Angeles, 2016. Maj Nava's research interests cover a variety of topics in atmospheric science to include problems in numerical weather prediction, tropical meteorology, mesoscale processes, and space physics. He has advised three MS students during his time on the AFIT faculty. Before joining AFIT, he was the Chief of Weather Operations at the Joint Space Operations Center in Vandenberg AFB, CA. He has seven archival publications and presentations and a member of the American Meteorological Society and American Geophysical Union. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4518, email: Omar.Nava@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Methodology for Assessing Sensor Performance in the Global Assimilation of Ionospheric Measurements Model."
Sponsor: Undisclosed. Funding: \$198,000 – Nava 50%, Stenger 50%.

“Frequency of Downburst Events at Individual Weather Towers in the Across Spaceport Florida.” Sponsor: 45 WS. Funding: \$17,000.

“Improved Real-time Monitoring of GPS Total Electron Content Measurements.” Sponsor: DARPA. Funding: \$200,000.

“Idealized Modeling of High Altitude Nuclear Detonation Effects on the Structure of the Ionosphere.” Sponsor: DARPA. Funding: \$200,000.

“Modulation of Lightning Occurrence by the Solar Wind.” Sponsor: AFOSR. Funding: \$40,467.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Tseng, H.R., O.A. Nava, C.D. Lewis, R.D. Loper, and R.C. Tournay (2018), “Environmental Modeling and Characterization of the Hypersonic Vehicle Operations Space,” *2018 Hypersonic Science & Technology Conference*.

Smith, Nathan D., Robert D. Loper, and Omar A. Nava (2017), “Mid-latitude Plasma Irregularities During Subauroral Polarization Streams,” *American Geophysical Union 2017 Fall Meeting*.

O'DAY, BUCKLEY E., LTC,

Assistant Professor of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 2015 (AFIT/ENP); BS, Civil Engineering, United States Military Academy, 1996; MIM, Master of International Management, University of Maryland University College, 2005; MS, Nuclear Engineering, Air Force Institute of Technology, 2009; PhD, Nuclear Science and Engineering, Massachusetts Institute of Technology, 2015. LTC O'Day's research interests cover a variety of topics in nuclear physics and nuclear engineering to include nuclear weapon effects, nuclear nonproliferation, nuclear counter proliferation, radiation health physics, and radiation detection. LTC O'Day is a basic branch Infantry Officer and a Nuclear Counter proliferation officer. He has advised one PhD students and four MS student received two research grant, and published two journal articles during his time on the AFIT faculty. He is a member of the American Nuclear Society and a research affiliate with the Department of Nuclear Science and Engineering at the Massachusetts Institute of Technology. Tel. 937-255-3636 x4609, email: Buckley.O'Day@afit.edu

REFEREED JOURNAL PUBLICATIONS

Michael A. Ford, Buckley E. O'Day, John W. McClory, Manish K. Sharma, Areg Danagoulian, “Evaluation of Eu:LiCAF for neutron detection utilizing SiPMs and portable electronics,” *Nuclear Instruments and Methods in Physics Research A*, Vol. 908, pp. 110-116, November 2018. <https://doi.org/10.1016/j.nima.2018.08.016>

R. J. Olesen, B. E. O'Day, D. E. Holland, L. W. Burggraf, and J. E. Bevins, “Characterization of Novel Rotating Scatter Mask Designs for Gamma Direction Identification,” *Nuclear Instrumentation and Methods in Physics Research Section A*, <https://doi.org/10.1016/j.nima.2018.09.067>

D. E. Holland, J. E. Bevins, L. W. Burggraf, and B. E. O'Day, “Rotating scatter mask optimization for gamma source direction identification,” *Nuclear Instruments and Methods Phys. Res. A*, Vol. 901, pp. 104-111, 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Michael A. Ford, Buckley E. O'Day, John W. McClory, and Areg Danagoulian, “Evaluation of LiCAF for Neutron Spectroscopy using SiPMs and Portable Electronics,” presented at the *2018 Symposium on Radiation Measurement and Analysis in Ann Arbor*, MI on 13 June 2018.

Zachary T. Condon, Larry W. Burggraf, Julie. V. Logan, Buckley E. O'Day, Robert J. Olesen, and James C. Petrosky, “Multisource Location Using a Rotating Scatter Mask to 1604 Predictably Attenuate Full Energy Gamma-Ray Emissions,” presented at the *2018 Hardened Electronics and Radiation Technology Conference in Tucson*, AZ on 19 April 2018.

D. E. Holland, J. E. Bevins, L. W. Burggraf, and B. E. O'Day, "Rotating scatter mask optimization for gamma source direction identification," presented at the *2018 Symposium on Radiation Measurement and Analysis* in Ann Arbor, MI on 12 June 2018.

R. J. Olesen, B. O. Day, D. Holland, L. Burggraf, and J. Bevins, "Characterization of Rotating Scatter Mask Designs for Novel Applications in Photon Detection," presented at the *2018 Symposium on Radiation Measurement and Analysis* in Ann Arbor, MI on 12 June 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

B. Egner, R. Torzilli, J. E. Bevins, and B. E. ODay, "Automated Parametric Optimization of a High-Purity Germanium Monte Carlo Neutral-Particle Model," presented at the *American Nuclear Society Student Conference*, Gainesville, FL, April 5th, 2018.

PERRAM, GLEN P.,

Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 1989 (AFIT/ENP); BS, Cornell University, 1980; MS, Air Force Institute of Technology, 1981; PhD, Air Force Institute of Technology, 1986. Dr. Perram's research interests include high power chemical lasers, optically pumped gas phase lasers, laser-material interactions, hyperspectral imaging, reaction kinetics, atomic and molecular spectroscopy, environmental science, photochemistry, optical diagnostics, and remote sensing. He has advised 36 PhD and 50 MS students, received 48 research grants, and published over 100 journal articles during his 29 years on the AFIT faculty. Dr. Perram is a fellow of the Directed Energy Professional Society and a Registered Professional Engineer in the State of Ohio. AFIT research center affiliation(s): CDE and CTISR. Tel. 937-255-3636 x4504, email: Glen.Perram@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Digital Holography: Recording Geometry." Sponsor: Undisclosed. Funding: \$82,077 – Perram 50%, Rice 50%. [CTISR]

"Wave Front Sensing for Laser Weapon Applications." Sponsor: AFRL/RD. Funding: \$100,000 – Perram 80%, Rice 20%. [CDE]

"HEL Analysis Tool. Phase IIE. Model Enhancements and Validation." Sponsor: MDA (Creare). Funding: \$150,000 – Perram 60%, Rice 40%. [CDE]

"Melt Pool Monitoring for Metal Additive Manufacturing." Sponsor: Navy STTR (ATS-MER, LLC). Funding: \$29,000. [CDE]

"In-Process Monitoring of Additive Manufacturing: Phase IIX, Inconel Spectra and Imagery." Sponsor: NASA (UTC). Funding: \$76,800. [CDE]

REFEREED JOURNAL PUBLICATIONS

Athanasios Gavrielides, L.A. (Vern) Schlie, Robert D. Loper, Michael R. Hawks, and Glen P. Perram, "Analytic treatment of beam quality and power efficiency in high power transverse flow Diode Pumped Alkali Laser" *J Optical Society of America B*, Vol. 35, pp. 2202-2210, Sep 2018.

Nicholas C. Herr, Ashley E. Gonzales, Glen P. Perram, "Kinetics, evolving thermal properties, and surface ignition of carbon fiber reinforced epoxy composite during laser-induced decomposition," *Polymer Degradation and Stability*, Vol. 152, pp. 147-161 Apr 2018.

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Woody S. Miller, Christopher A. Rice, and Glen P. Perram, "Temperature dependence of the helium induced broadening and shift of the Rb D1 and D2 lines," *J Quantitative Spectroscopy and Radiative Transfer*, Vol. 206, pp. 151-156, 2018.

Daniel J. Emmons, David E. Weeks, Ben Eshel, and Glen P. Perram, "Metastable Ar(1s5) density dependence on pressure and argon-helium composition in a high pressure radio frequency dielectric barrier discharge," *Journal of Applied Physics* 123, 043304 Feb 2018.

Ben Eshel and Glen P. Perram, "A five-level Ar-He laser model for characterization of a diode-pumped rare gas laser," *J Optical Society of America B* Vol. 35, pp. 164-173, Jan 2018.

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William Bauer, Glen P. Perram, Timothy Haugan, "Comparison of plume dynamics for laser ablated metals: Al and Ti," *Journal of Applied Physics*, 123, 095304, March 2018.

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REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Douglas E. Thornton, Mark F. Spencer, Christopher A. Rice, and Glen P. Perram, "Efficiency measurements for a digital-holography system," *Proc SPIE* 1065004, Defense and Security, Apr 2018.

Athanasios Gavrielides, L.A. Schlie, Robert Loper, Michael Hawks, and Glen P. Perram, "Analytic treatment of high power diode pumped lasers with unstable resonator in a flowing medium," *Proc SPIE* 1051815, invited talk for *SPIE Photonics West*, San Francisco, CA 27 Jan – 1 Feb 2018

Nathan Haluska, Christopher A. Rice, and Glen P. Perram, "CW 3 μ m Lasing via Two-Photon Pumping in Cesium vapor with a 1 W source," *Proc SPIE* 105112M, *SPIE Photonics West*, San Francisco, CA 27 Jan – 1 Feb 2018.

Nathan Haluska, Christopher A. Rice, and Glen P. Perram, "Efficient Non-linear Two-Photon effects from the Cesium 6D Manifold," *Proc SPIE* 1051606, *SPIE Photonics West*, San Francisco, CA 27 Jan – 1 Feb 2018.

Richard D. Peterson, Ben Eshel, Christopher A. Rice, Glen P. Perram, "Excited argon production in micro-hollow cathode discharge arrays for use as potential rare gas laser sources," *Proc SPIE* 105112K, *SPIE Photonics West*, San Francisco, CA 27 Jan – 1 Feb 2018.

AJ Wallerstein, Glen Perram, Christopher A. Rice, "Excitation of Higher Lying Energy States in a Potassium DPAL," *Proc SPIE* 105112J *SPIE Photonics West*, San Francisco, CA 27 Jan – 1 Feb 2018.

PETROSKY, JAMES C.,

Deputy Department Head, Professor of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 2000 (AFIT/ENP); BA, Engineering Physics/Computer Science, Millersville University of Pennsylvania, 1984; MS, Engineering Physics, Rensselaer Polytechnic Institute, 1992; PhD, Engineering Physics, Rensselaer Polytechnic Institute, 1995. Dr. Petrosky has expertise in radiation effects on electronic devices, EMP, experimental design, radiation detection, and nuclear weapon effects. His research spans narrow and wide band gap materials using combinations of electrical, optical, and absorption spectroscopy to gain information on the damaging effects of ionizing and non-ionizing radiation. Experimental techniques include I-V(T), C-V(T), photoluminescence spectroscopy, Hall Effect, x-ray and UV photo spectroscopy; applications of measurement techniques in harsh environments/in-situ measurements and obtaining real-time data. Applications include electronic switches and actuators, RF/IR sensors, force transducers, and electronics controls for use in the space and nuclear weapons environment. Dr. Petrosky has successfully chaired 11 PhD students, 45 Master's students, and mentored and supported six post-doctoral researchers. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4562, email: James.Petrosky@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Endowed Term Chair.” Sponsor: AFTAC. Funding: \$120,000 – Petrosky 50%, Bevins 25%, Tseng 25%.

“Support Activities to Homeland Security.” Sponsor: DHS. Funding: \$200,000.

REFEREED JOURNAL PUBLICATIONS

J. R. Fee Jr. and J. C. Petrosky, “Validation of the Air Burst EMP Simulation Capability, B-code,” *Journal of Rad Effects, Res, and Eng.* Vol. 35 (SECRET), April, 2018.

Christina L Dugan, George Glenn Peterson, Alyssa Mock, Christopher Young, J Matthew Mann, Michael Nastasi, Mathias Schubert, Lu Wang, Wai-Ning Mei, Iori Tanabe, Peter A Dowben, James Petrosky, “Electrical and material properties of hydrothermally grown single crystal (111) UO₂,” *The European Physical Journal B*, April, 2018. [CSRA]

PHILLIPS, GRADY T.

Research Assistant Professor of Engineering Physics (through ORISE), Department of Engineering Physics, AFIT Appointment Date: 2014 (AFIT/ENP); BS, Physics, Wofford College, 1990; BA, Mathematics, Wofford College, 1990; MS, Physics, Clemson University, 1993; PhD, Applied Physics, Air Force Institute of Technology, 2006. Dr. Phillips’ research interests include remote sensing encompassing spectral signatures from laser/material interactions, hyperspectral imagery, and environmental monitoring, and experimental research utilizing laser physics, spectroscopy, chemical kinetics, and flow dynamics to advance technologies in high power chemical lasers, gas phase lasers, and optical diagnostics. AFIT research center affiliation(s): CDE. Tel. 937-255-3636 x4643, email: Grady.Phillips.ctr@afit.edu

RICE, CHRISTOPHER A.,

Research Assistant Professor, Department of Engineering Physics, AFIT Appointment Date: 2012 (AFIT/ENP); BS, Electrical Engineering, Cedarville University, 2004; MS, Electrical Engineering, Air Force Institute of Technology, 2006; PhD, Applied Physics, Air Force Institute of Technology, 2012. Dr. Rice is interested in topic areas related to high energy lasers, remote sensing, and optical diagnostics. His work on specific research topics currently include atmospheric propagation of diode pumped alkali lasers; diode pumped alkali and rare gas laser gain construction; aerosol measurement and validation; modeling, simulation, and validation of directed energy simulations; and remote sensing. AFIT research center affiliation(s): CDE and CTISR. Tel. 937-255-6565 x4375, email: Christopher.Rice@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“The Enhanced Navy Simulation of the Extended MBL Environment (ENSEMBLE) Toolkit – Phase I Support to Spectral Sciences, Inc.” Sponsor: Navy STTR (Spectral Sciences). Funding: \$67,500. [CDE/CTISR]

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Fletcher, A., Turner, D., Fairchild, S., Rice, C., & Pitz, G. (2018). “ToF-SIMS Characterization of Robust Window Material for Use in Diode Pumped Alkali Lasers,” *Physica Status Solidi (A)*, 215(2), 1700728. <http://doi.org/10.1002/pssa.201700728> [CDE]

Eshel, B., Rice, C. A., & Perram, G. P. (2018). "Saturation spectroscopy of an optically opaque argon plasma," *Applied Physics B*, 124(2), 33. <http://doi.org/10.1007/s00340-017-6869-6>

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Jack E. McCrae, Connor E. Murphy, Santasri R. Bose-Pillai, Christopher A. Rice, and Steven T. Fiorino, "The Influence of Wind on Anisotropy in Optical Turbulence," *2018 IEEE Aerospace Conference*, Big Sky, MT, 3-10 Mar 2018. [CDE]

McCrae, J.E. C.E. Murphy, S.R. Bose-Pillai, C.A. Rice, and S.T. Fiorino, "The Influence of Wind on Anisotropy in Optical Turbulence," *2018 IEEE Aerospace Conference*, Big Sky, MT, 3-10 Mar 2018. [CDE]

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S. R. Bose-Pillai, J. McCrae, C. Rice, and S.T. Fiorino, "First Look at Profiling Atmospheric Turbulence along a Path using the Hartmann Turbulence Sensor," *13th Annual Directed Energy Systems Symposium*, Portsmouth, VA, September 2018. [CDE]

Jack E. McCrae, Santasri R. Bose-Pillai, Christopher A. Rice, and Steven T. Fiorino, "Global tilt removal on a Hartmann turbulence sensor," *Proc. SPIE 10770*, Laser Communication and Propagation through the Atmosphere and Oceans VII, 107700V (18 Sep 2018). [CDE]

Santasri R. Bose-Pillai, Jack E. McCrae, Matthew D. Wilson, Andrew L. Back, Christopher A. Rice, and Steven T. Fiorino, "Profiling of atmospheric turbulence along a path using two beacons and a Hartmann turbulence sensor," *Proc. SPIE 10772*, Unconventional and Indirect Imaging, Image Reconstruction, and Wavefront Sensing 2018, 107720C (18 Sep 2018). [CDE]

Bose-Pillai, S.R., J.E. McCrae, R.A. Wood, C.E. Murphy, C.A. Rice, S.T. Fiorino, "Characterizing atmospheric turbulence over long paths using time-lapse imagery," *Proc. SPIE 10650*, Long-Range Imaging III, 106500A (11 May 2018); doi: 10.1117/12.2305077. [CDE]

Douglas E. Thornton, Mark F. Spencer, Christopher A. Rice, and Glen P. Perram, "Efficiency measurements for a digital-holography system," *Proc SPIE 1065004*, Defense and Security, Apr 2018.

Santasri Bose-Pillai, Jack McCrae, Christopher Rice, and Steven Fiorino, "Characterizing atmospheric turbulence over long paths using time-lapse imagery," *20th Annual DEPS S+T Symposium*, Oxnard, CA, 26 Feb – 02 Mar, 2018. [CDE]

Jack McCrae, Santasri Bose-Pillai, Christopher Rice, and Steven Fiorino, "Analysis of Tilt Removed Hartmann Turbulence Sensor Data," *20th Annual DEPS S+T Symposium*, Oxnard, CA, 26 Feb – 02 Mar, 2018. [CDE]

Wallerstein, A., Perram, G. P., & Rice, C. A. (2018) "Excitation of higher lying energy states in a rubidium DPAL," In W. A. Clarkson & R. K. Shori (Eds.), *Solid State Lasers XXVII: Technology and Devices* (Vol. 10511, pp. 92). SPIE. <http://doi.org/10.1117/12.2286888> [CDE]

Peterson, R., Eshel, B., Rice, C. A., & Perram, G. P. (2018) "Excited argon 1s5 production in micro-hollow cathode discharge arrays for use as potential rare gas laser sources," In W. A. Clarkson & R. K. Shori (Eds.), *Solid State Lasers XXVII: Technology and Devices* (Vol. 10511, pp. 93). SPIE. <http://doi.org/10.1117/12.2287511>[CDE]

Spencer, M. F., Thornton, D. E., Perram, G. P., & Rice, C. A. (2018) "Efficiency measurements for a digital-holography system," In E. J. Kelmelis (Ed.), *Long-Range Imaging III* (Vol. 10650, p. 3). SPIE. <http://doi.org/10.1117/12.2304689> [CDE]

Nathan Haluska, Christopher A. Rice, and Glen P. Perram, "CW 3 μ m Lasing via Two-Photon Pumping in Cesium vapor with a 1 W source," *Proc SPIE 105112M*, *SPIE Photonics West*, San Francisco, CA 27 Jan – 1 Feb 2018. [CDE]

- Nathan Haluska, Christopher A. Rice, and Glen P. Perram, “Efficient Non-linear Two-Photon effects from the Cesium 6D Manifold,” Proc SPIE 1051606, *SPIE Photonics West*, San Francisco, CA 27 Jan – 1 Feb 2018. [CDE]
- Richard D. Peterson, Ben Eshel, Christopher A. Rice, Glen P. Perram, “Excited argon production in micro-hollow cathode discharge arrays for use as potential rare gas laser sources,” Proc SPIE 105112K, *SPIE Photonics West*, San Francisco, CA 27 Jan – 1 Feb 2018. [CDE]
- AJ Wallerstein, Glen Perram, Christopher A. Rice, “Excitation of Higher Lying Energy States in a Potassium DPAL,” Proc SPIE 105112J *SPIE Photonics West*, San Francisco, CA 27 Jan – 1 Feb 2018. [CDE]
- Rice, C. A., Lapp, K., Rapp, A., & Perram, G, “D1 and D2 Rubidium Lineshapes with High Pressure Rare Gases,” *2018 Annual Directed Energy S&T Symposium*, Oxnard, CA. [CDE]
- Bose-Pillai, S., Rice C. A., McCrae, J., *et. al.* Characterizing Atmospheric Turbulence over Long Paths using Time-lapse Imagery. 2018 Annual Directed Energy S&T Symposium, Oxnard, CA. [CDE]
- McCrae, J., Rice C. A., Bose-Pillai, S., *et. al.*, “Analysis of Tilt Removed Hartmann Turbulence Sensor Data,” *2018 Annual Directed Energy S&T Symposium*, Oxnard, CA. [CDE]
- Eshel, B., Peterson, R., Rice, C. A., & Perram, G. Scaling, “Potential of the Diode-Pumped Rare Gas Laser,” *2018 Annual Directed Energy S&T Symposium*, Oxnard, CA. [CDE]
- Fiorino, S.T., K. Keefer, C. Rice, J. Burley, and J. Schmidt, “Characterizing Multispectral Vertical Profiles of Aerosol Extinction with Surface-based Measurements,” *2018 Annual Directed Energy S&T Symposium*, Oxnard, CA. [CDE]
- Fiorino, S.T., K.J. Keefer, C.A. Rice, J.L. Burley, and J. Schmidt, “Characterizing Multispectral Vertical Profiles of Aerosol Extinction with Surface-Based Measurements,” 22nd Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface (IOAS-AOLS), 98th Annual American Meteorological Society Meeting, Austin, TX, Jan 2018. (<https://ams.confex.com/ams/98Annual/webprogram/Paper335342.html>). [CDE]

RIES, HEIDI R.,

Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 1999 (AFIT/ENP); Dean for Research, Graduate School of Engineering and Management (AFIT/ENR); Interim Dean, Graduate School of Engineering and Management (2013); BS, Physics, The Ohio State University, 1982; MS, Physics, The Ohio State University, 1984; PhD, Applied Physics, Old Dominion University, 1987. Dr. Ries serves as AFIT’s chief research officer, primary liaison to the Air Force Research Laboratory, and served as Interim Dean during FY13. Dr. Ries’ research interests include radiation effects, nonlinear optical materials, electron paramagnetic resonance spectroscopy, and laser processing of materials. Prior to joining the AFIT faculty, Dr. Ries served as Director of the Center for Materials Research at Norfolk State University in Norfolk, Virginia, and Associate Director of the Applied Research Center at the Jefferson Center for Research and Technology Research Park in Newport News, Virginia. Dr. Ries was elected to the ASEE Engineering Research Council Board of Directors in 2008 and served a two-year term as Secretary/Treasurer (2011-2013). She has served on the Engineering and Science Foundation of Dayton Board since 2005 and as its Chair since 2015. Dr. Ries serves as a peer evaluator and team chair for Higher Learning Commission accreditation processes. She was recognized by the Dayton Daily News as one of the region’s 2009 Ten Top Women, and was the Air Force’s civilian winner of the 2011 Department of Defense Women's History Month Foreign Language and Science, Technology, Engineering and Math (STEM) Role Model Award. Tel. 937-255-3636 x4544, email: Heidi.Ries@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“AFRL-AFIT MOA Partnership Agreement.” Sponsor: AFOSR. Funding: \$87,889.

SHATTAN, MICHAEL B., LTC,

Assistant Professor of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 2018 (AFIT/ENP); BS, United States Military Academy 1999; MS, Massachusetts Institute of Technology 2008; PhD,

University of Tennessee 2018. LTC Shattan's research interest focus on the use of Laser-Induced Breakdown Spectroscopy (LIBS) for nuclear forensics purposes as well as studying the physics and chemistry of simulated nuclear fireball environments via laser spectroscopy techniques. Additionally, LTC Shattan is interested in Resonance Enhanced Multiphoton Ionization (REMPI) techniques for trace gas and particulate detection. Before joining AFIT he was a PhD candidate at the University of Tennessee. He also holds a Professional Engineer license in the commonwealth of Virginia. Tel. 937-255-3636 x4587, email Michael.Shattan@afit.edu

REFEREED JOURNAL PUBLICATIONS

Michael Shattan, Adam Seybert, Robert Boone Gilbreath, Stephen Dahunsi, Howard L. Hall, (2018) "The use of tabletop exercises in nuclear security education," *Journal of Applied Research in Higher Education*, Vol. 10 Issue: 3, pp. 344-356, <https://doi.org/10.1108/JARHE-11-2017-0146>

Michael B. Shattan, Dorothy J. Miller, Matthew T. Cook, Ashley C. Stowe, John D. Auxier, Christian Parigger, and Howard L. Hall, "Detection of uranyl fluoride and sand surface contamination on metal substrates by hand-held laser-induced breakdown spectroscopy," *Appl. Opt.* 56, 9868-9875 (2017)

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Shattan, M. B, et al., "Mapping Analyte Distributions in Surrogate Nuclear Melt Glass Using Laser-Induced Breakdown Spectroscopy and Micro X-Ray Fluorescence," Reno, SCIX 2017, October, 2017.

STENGER, ROBERT A., Lt Col,

Assistant Professor of Atmospheric Science, Department of Engineering Physics, AFIT Appointment Date: 2015 (AFIT/ENP); BS, Texas A&M University, 1994; MS, Air Force Institute of Technology, 2000; PhD, Naval Postgraduate School, 2013. Lt Col Stenger's research interests cover a variety of topics in atmospheric science to include problems in numerical weather prediction, tropical meteorology, and satellite radiance correction. Before joining AFIT he was Deputy Director, Office of Mission Engineering, System Engineering Directorate at the National Reconnaissance Office. He has four archival publications and presentations. He is a member of the American Meteorological Society. Tel. 937-255-3636 x4505, email: Robert.Stenger@afit.edu

STEWART, BRYAN J.,

Research Assistant Professor of Optical Engineering, Department of Engineering Physics, AFIT Appointment Date: 2015 (AFIT/ENP); BS, Optical Sciences & Engineering, University of Arizona, 2004; MS, Applied Physics, Air Force Institute of Technology, 2006; PhD, Optical Sciences & Engineering, Air Force Institute of Technology, 2011. Dr. Stewart's current research interests include infrared and electro-optical remote sensing, physics-based sensor and scene modeling, and algorithm development primarily for application to technical intelligence problems. Additional interests include characterization of battlespace combustion (e.g. muzzle flash, detonations, and rocket plumes), methods for assessing on-orbit sensor performance, and machine learning. He has 16 archival publications and presentations. Before joining AFIT, he spent over nine years at the National Air and Space Intelligence Center (NASIC) where he most recently led R&D activities as a Principal Intelligence Analyst in the Persistent Infrared Squadron. AFIT research center affiliation(s): CSRA and CTISR. Tel. 937-255-3636 x4639, email: Bryan.Stewart@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Support to TAP Lab Effort (STAPLES)." Sponsor: SMC. Funding: \$325,000 – Stewart 90%, Gross 10%. [CTISR]

"Sensor Data Fusion for Improved Target Detection Location (Continuation)." Sponsor: AFRL/RV. Funding: \$40,500. [CSRA]

"Persistent Infrared Scientific and Analytical Support." Sponsor: NASIC. Funding: \$350,000 – Stewart 90%, Gross 10%. [CTISR]

“Persistent Infrared Scientific and Analytical Support (Amendment).” Sponsor: NASIC. Funding: \$150,000 – Steward 10%, Gross 10%, Borghetti 80%. [CTISR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

M. J. Schwaab, R. Greendyke, and B. J. Steward, “Comparison of Burn Rate Models to Reaching Chemistry Model for HMX,” *The American Society of Mechanical Engineers International Mechanical Engineering Congress*, Phoenix, AZ (15 Nov 2017). [CTISR]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Program committee, 13th IEEE International Conference on Automatic Face & Gesture Recognition (FG 2018) (Xi'an, China on May 15-19, 2018).

TOURNAY, ROBERT C., Lt Col

Assistant Professor of Atmospheric Science, Department of Engineering Physics, AFIT Appointment Date: 2018 (AFIT/ENP); BS, University of Maryland, College Park, 2000; MS, Naval Postgraduate School, 2008; PhD, Colorado State University, 2016. Lt Col Tournay’s research interests include land surface-atmosphere interaction, numerical weather modeling, hydrology and flooding as well as applying artificial intelligence and machine learning to weather forecasting. Prior to his PhD studies, Lt Col Tournay served as Commander, 16th Weather Squadron, Offutt AFB, Nebraska as well as Commander, 46th Weather Squadron, Eglin AFB, Florida. Lt Col Tournay deployed to Iraq in support of Operation IRAQI FREEDOM as well as Qatar in support of AF Central Command operations. He is a member of the American Meteorological Society. Tel. 937-255-3636 x4743, email: Robert.Tournay@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Tournay, R.C., “US Air Force Numerical Weather Modeling Capabilities,” Presented at the *American Meteorological Society WAF/NWO Meeting*, Denver, CO, May 2018

Tseng, H.R., O.A. Nava, C.D. Lewis, R.D. Loper, and R.C. Tournay (2018), “Environmental Modeling and Characterization of the Hypersonic Vehicle Operations Space,” *2018 Hypersonic Science & Technology Conference*.

TSENG, H. ROSE, Maj,

Assistant Professor of Atmospheric Science, Department of Engineering Physics, AFIT Appointment Date: 2016 (AFIT/ENP); BS, University of California at Los Angeles (UCLA), 2004; MS, Naval Postgraduate School, 2010; PhD, UCLA, 2016. Maj Tseng’s research interests include future climatological changes, the influence of aerosols on precipitation and tropical cyclones, and the Arctic sea ice decline, as these topics pertain to future political, societal and environmental impacts. Prior to her PhD studies, Maj Tseng served as Commander, Detachment 1, 607th Weather Squadron at Camp Red Cloud, Republic of Korea. Maj Tseng has given a number of talks regarding her research on the effects of black carbon on precipitation to include the University of California (Carbon Neutrality Initiative) and the Pardee RAND Graduate School (LA Policy Symposium). Maj Tseng also serves as Board Advisor for Women Veteran Issues for The BREATH Center in San Clemente, CA. Maj Tseng served a deployment tour as USAF Joint Meteorological and Oceanographic Officer- Afghanistan and NATO Headquarters Resolute Support Chief Meteorological Officer from April- October 2017 in Kabul, Afghanistan. Tel. 937-255-3636 x4520, email: Hsien-Liang.Tseng@afit.edu

REFEREED JOURNAL PUBLICATIONS

Qi, L., Q. Li, D. K. Henze, H.-L. Tseng, and C. He, “Sources of springtime surface black carbon in the Arctic: an adjoint analysis for April 2008 (2017),” *Atmos. Chem. Phys.*, 17, 9697-9716, <https://doi.org/10.5194/acp-17-9697-2017>.

TUTTLE, RONALD F.,

Associate Professor of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 2001 (AFIT/ENP); BS, Chemical Engineering, University of Missouri (Columbia), 1968; MS, Nuclear Engineering,

University of Missouri (Columbia), 1970; PhD, Nuclear Engineering, University of Missouri (Columbia), 1980. Dr. Tuttle's research areas include applications of active and passive remote sensing, spectroscopy, diagnostics, and signals processing to problems in intelligence collection and exploitation. Other areas of interest include nuclear weapon effects and space nuclear power systems modeling and mechanics of aerosols. He has published in both unclassified and classified refereed archival journals and conference proceedings. Dr. Tuttle served as Director, Center for Technical Intelligence Studies and Research (CTISR), AFIT, until Aug 2012. Tel. 937-255-3636 x4536, email: Ronald.Tuttle@afit.edu

WEEKS, DAVID E.,

Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 1993 (AFIT/ENP); BA, Physics, Colgate University, 1983; MS, Physics, Georgia Institute of Technology, 1985; PhD, Physics, University of Arkansas, 1989. Dr. Weeks' research interests include the development of time dependent wave packet methods to model the quantum mechanics of simple chemical reactions and compute associated state to state reactive scattering matrix elements. Of particular interest are new methods that incorporate non-adiabatic coupling between electronic and nuclear degrees of freedom. New research interests include fiber laser modeling and the development of plasma models to improve the operation of noble gas laser systems. AFIT research center affiliation(s): CDE. Tel. 937-255-3636 x4561, email: David.Weeks@afit.edu

SPONSOR FUNDED RESEARCH

"Theoretical Models of Novel Glass Fiber Lasers." Sponsor: AFRL/RD. Funding: \$40,000. [CDE]

REFEREED JOURNAL PUBLICATIONS

L.A. Blank, A.R. Sharma, and D. E. Weeks, "Influence of Basis-Set Size on the $X\ 2\ \Sigma\ 1/2$, $A\ 2\ \Pi\ 1/2$, $A\ 2\ \Pi\ 3/2$ and $B\ 2\ \Sigma\ 1/2$ Potential-Energy Curves, $A\ 2\ \Pi\ 3/2$ Vibrational Energies, and D1 and D2 Line Shapes of Rb+He," *Phys. Rev. A*, 97 (2018) 032705.

D.J. Emmons, D.E. Weeks, B. Eshel, and G.P. Perram, "Metastable Ar(1s5) Density Dependence on Pressure and Argon-Helium mixture in a High Pressure Radio Frequency Dielectric Barrier Discharge," *J. Appl. Phys.*, 123 (2018) 043304.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

R. Lloyd, D.E. Weeks, G.P. Perram, "A Benchmark Study of the Laser Model Toolkit," submitted to Create in April 2018 as part of an MDA SBIR research effort.

WOLF, PAUL J.,

Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 1994 (AFIT/ENP), and Associate Dean for Academic Affairs, Graduate School of Engineering and Management (AFIT/EN); BS, Regis College, 1978; MS, Air Force Institute of Technology, 1979; PhD, Air Force Institute of Technology, 1985. Dr. Wolf serves as the Associate Dean for Academic Affairs responsible for administrative leadership for all academic matters in the Graduate School and serves as AFIT's accreditation liaison to the Higher Learning Commission and ABET. Dr. Wolf's current scholarly interests include emergent behaviors of complex systems, foundations of quantum mechanics, and existential threat analyses. Dr. Wolf has made experimental contributions to atomic/molecular spectroscopy, reactive and non-reactive collision kinetics, laser-based thin film deposition processes, ionospheric and atmospheric chemistry, and environmental monitoring. Prior to joining the AFIT faculty in 1994, Dr. Wolf served as Chief, Visible Chemical Laser Section at the Air Force Weapons Laboratory (Kirtland AFB, NM), Director/Principal Investigator of the Materials Physics Division at the F.J. Seiler Research Laboratory (USAFA, CO), Assistant Professor of Physics in the Physics Department at the U.S. Air Force Academy, and Research Director for Impulse Laser Effects at the Defense Nuclear Agency. He has over 20 publications in refereed archival journals. Tel. 937-255-3636 x4560, email: Paul.Wolf@afit.edu

YEO, YUNG KEE,

Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 1984 (AFIT/ENP); BS, Seoul National University, 1961; PhD, University of Southern California, 1972. Dr. Yeo's research interests are in the area

of solid state physics, especially characterization of the electrical and optical properties of elemental, compound, ternary, and quaternary semiconductors using techniques such as Hall-effect measurement, deep level transient spectroscopy, electroluminescence, and photoluminescence. Dr. Yeo has published around 120 articles in archival journals and several technical reports, presented around 220 papers at professional conferences, and holds one patent. He is a reviewer for the Applied Physics Letters, Journal of Applied Physics, Journal of Electronic Materials, and Air Force Office of Scientific Research (AFOSR) proposal. He is currently funded by the AFOSR to study Si- and Ge-based semiconductors such as GeSn and GeSiSn. This work involves collaborative effort with the Arizona State University, University of Delaware, Kangwon National University, and Taiwan National University. He has directed the research of seven post-doc fellows, five visiting research faculty members, 16 PhD students and 26 MS students. He received the Ezra Kotcher Award for 1990, the Gage H. Crocker Outstanding Professor Award for 1992, and the General Bernard A. Schriever Award for 1997. Tel. 937-255-3636 x4532, email: Yung.Yeo@afit.edu

5.4. DEPARTMENT OF MATHEMATICS AND STATISTICS

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5.4.1. DOCTORAL DISSERTATIONS

BROOKS, ERIC L., Compressive Sampling for Phenotype Classification. AFIT/ENC/DS/18S-001. Faculty Advisor: Dr. Christine M. Schubert Kabban. Sponsor: N/A.

MORRILL, DANA F., Numerical Simulation of High Energy Laser Propagation. AFIT/ENC/DS/18S-003. Faculty Advisor: Dr. Benjamin F. Akers. Sponsor: N/A. [CDE]

NUNNALLY, BEAU A., Statistical Inference to Evaluate and Compare Correlated Multi-State Classification Systems. AFIT/ENC/DS/18S-004. Faculty Advisor: Dr. Christine M. Schubert Kabban. Sponsor: N/A.

5.4.2. MASTER'S THESES

BOONE, STEPHANIE M., Shortest Path across Stochastic Network with Correlated Random Arcs. AFIT/ENC/MS/18M-109. Faculty Advisor: Lt Col Andrew J. Geyer. Sponsor: AMC.

BUNECKE, KIRSTEN, Improving Annual Fixed Wing Aircraft Maintenance Cost Estimates through Cost Estimating Relationships. AFIT/ENC/MS/18M-185. Faculty Advisor: Dr. Edward D. White. Sponsor: AFCAA.

ELLIS, JAMES C., The Impact of Changing Requirements. AFIT/ENC/MS/18M-200. Faculty Advisor: Dr. Edward D. White. Sponsor: AFLCMC.

HILL, DANIEL E., Lightning Prediction Using Artificial Neural Networks and Electric Field Mill Data. AFIT/ENC/MS/18M-002. Faculty Advisor: Lt Col Richard S. Seymour. Sponsor: 45 WS. [CSRA]

JOHNSON, JAKE E., Analysis of a Medical Center's Cardiac Risk Screening Protocol Using Propensity Score Matching. AFIT/ENC/MS/18M-129. Faculty Advisor: Lt Col Andrew J. Geyer. Sponsor: University of Maryland Medical Center.

KIM, DEBORAH B., An Analysis of the Estimate at Complete for Department of Defense Contracts. AFIT/ENC/MS/18M-214. Faculty Advisor: Dr. Edward D. White. Sponsor: N/A.

LAWRENCE, ANDREW P., Simulation and Modeling of High Energy Laser-Induced Droplet Shattering in Clouds. AFIT/ENC/MS/18M-003. Faculty Advisor: Dr. Benjamin F. Akers. Sponsor: N/A.

NG, JUSTIN, Radial Basis Function Generated Finite Differences for the Nonlinear Schrodinger Equation. AFIT/ENC/MS/18M-004. Faculty Advisor: Maj Jonah Reeger. Sponsor: ONR.

5.4.3. FACULTY BIOGRAPHIES & RESEARCH OUTPUT

Notes: Research Center affiliations are listed in [] if applicable. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

AKERS, BENJAMIN F.,

Associate Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2011 (AFIT/ENC); BS, Pennsylvania State University, 2003; MA, University of Wisconsin - Madison, 2005; PhD, University of Wisconsin-Madison, 2008. Dr. Akers' research interests include nonlinear waves, applied mathematics, fluid mechanics, and numerical analysis. Dr. Akers' current research considers the stability and existence of traveling water waves as well as the fluid flows induced by high energy lasers. AFIT research center affiliation(s): CDE. Tel. 937-255-3636 x4522, email: Benjamin.Akers@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Applications of Radial Basis Functions." Sponsor: AFOSR. Funding: \$33,990 – Akers 50%, Reeger 50%. [CDE]

REFEREED JOURNAL PUBLICATIONS

Akers, B. F., Ambrose, D. M., and Sulon, D. W., "Periodic hydroelastic waves with or without mass," *Zeitschrift für angewandte Mathematik und Physik*, 68:141, Dec 2017.

Paulec, M., Marciniak, M., Gross, K., Akers, B., and Azevedo, D., Tomographic reconstruction of a jet engine exhaust plume using an infrared hyperspectral imager, *Optical Engineering* 57(10), 103103(1-12) (2018). [CTISR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Morrill, D. and Akers, B., "High Energy Laser Propagation: Environmental Effects," *Imaging and Applied Optics*, PW1D.4, 2017. [CDE]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Akers, B., "Overturned interfacial traveling waves," Erwin Schrodinger Institute, Vienna, Austria, Nov 2017.

Akers, B., "Modulational instabilities of traveling waves," AMS Midwestern Sectional, Ohio State University, Columbus, OH, Mar 2018.

Akers, B., "Modulational instabilities of traveling waves," KUMUNU PDE Conference, Lawrence, KS, Apr 2018.

ARMSTRONG, ANDREW M., Maj,

Assistant Professor of Statistics, Department of Mathematics and Statistics, AFIT Appointment Date: 2016 (AFIT/ENC); BS, Michigan Technological University, 2008; MS, Air Force Institute of Technology, 2010; MS, University of Texas at San Antonio, 2011; PhD, Air Force Institute of Technology, 2016. Maj Armstrong's research interests include wavelet analysis, astrostatistics, machine learning, big data, and computational statistics. Tel. 937-255-3636 x7403, email: Andrew.Armstrong@afit.edu

BAKER, WILLIAM P.,

Associate Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 1986 (AFIT/ENC); BA, University of California at Irvine, 1969; MA, University of California at Irvine, 1970; PhD, Northwestern University, 1987. Dr. Baker's research interests include asymptotic and perturbation methods, wave propagation and scattering theory, applied mathematics, functional analysis, low observables, and numerical analysis. Dr. Baker's current research is in thermal dynamics of high speed wear, vibrational dynamics of thermally loaded materials, and dynamics and control of satellite structures. Dr. Baker is a Master Navigator with prior military assignments in flight test, satellite communications, cruise missile, and radar analysis. Tel. 937-255-3636 x4517, email: William.Baker@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Rutledge, J. L. and Baker, W. P., *Unsteady Effects on the Experimental Determination of Overall Effectiveness*, Proceedings of ASME Turbo Expo 2018: Turbomachinery Technical Conference and Exposition, Oslo, Norway, GT2018-75846, 11-15 Jun 2018.

Havrilla, M., Hyde, M., Collins, P., and Baker, W., *Rotated Uniaxial Anisotropic Material Characterization – Theory*, Proceedings of 39th Annual Symposium of the Antenna Measurement Techniques Association, pp. 361-365, Oct 2017.

Knisely, A., Havrilla, M., Hyde, M., Collins, P., and Baker, W., *Rotated Uniaxial Anisotropic Material Characterization – Experiment*, Proceedings of 39th Annual Symposium of the Antenna Measurement Techniques Association, pp. 366-371, Oct 2017.

Deleon, A., Baker, W., and Palazotto, A., *Evaluation of a Nonlinear Melt Region*, Proceedings of AIAA Sci Tech 2018, Kissimmee, FL Paper #AIAA-2018-0187, 8-12 Jan 2018.

Deleon, A., Palazotto, A., and Baker, W., *Evaluation of Wear Damage During a High Speed Scenario*, 3rd Thermal and Fluid Engineering Conference, Fort Lauderdale, FL Paper #1830, 4-7 Mar 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Deleon, A., Baker, W., and Palazotto, A., *Tracking a Nonlinear Melt Region Produced During a High Velocity Event*, 10th Annual ASME Dayton Engineering Science Symposium, Wright State University, Dayton, OH, Oct 2017.

Deleon, A., Palazotto, A., and Baker, W., *Investigating the Nonlinear Melt Region Produced within a High Speed Environment*, 43rd Dayton-Cincinnati Aerospace Science Symposium, Sinclair Conference Center, Dayton OH, 27 Feb 2018.

BEMROSE, TRAVIS J., Maj,

Assistant Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2016 (AFIT/ENC); BS, University of Idaho, 2003; MS, University of Texas at San Antonio, 2012; PhD, University of Missouri – Columbia, 2016. Maj Bemrose's research interests include Hilbert space frame theory, compressive sensing, numerical methods, and modeling and simulation. His current research is on the Paulsen problem, adaptive-dictionary image reconstruction, and equiangular frames. He has papers on subspace distances, unconditional convergence bounds for frames, introducing the concept of weaving frames, and cruise missile training simulators. Tel. 937-255-3636 x4619, email: Travis.Bemrose@afit.edu

BROOKS, ERIC L., Maj

Assistant Professor of Statistics, Department of Mathematics and Statistics, AFIT Appointment Date: 2018 (AFIT/ENC); BS, University of South Carolina-Aiken, 2001; MS, Rochester Institute of Technology, 2012; PhD, Air Force Institute of Technology, 2018. Maj Brooks' research interests include big data, machine learning, statistical genetics, compressive sampling. In his current research, he addresses the high-dimensionality challenge associated with DNA data by leveraging concepts of compressive sampling for feature selection and dimensionality reduction. Tel. 937-255-3636 x4398, email: Eric.Brooks@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Brooks, E. and Kappedal, R. "Compressive sampling for phenotype classification" 2017 IEEE International Conference on Bioinformatics and Biomedicine (BIBM), Kansas City, MO, pp. 1857-1863, 16 Nov 2017.

BULUTOGLU, DURSUN A.,

Associate Professor of Statistics, Department of Mathematics and Statistics, AFIT Appointment Date: 2004 (AFIT/ENC); BS, University of Maryland at College Park, 1996; PhD, University of California, Berkeley, 2001. Dr. Bulutoglu's research interests include design of experiments and combinatorial problems in statistics. His papers are on finding GMA (generalized minimum aberration) factorial designs by enumerating all non-isomorphic orthogonal

arrays. The tools he uses for enumerating orthogonal arrays are integer programming, constraint programming, and isomorphism rejection. Tel. 937-255-3636 x4704, email: Dursun.Bulutoglu@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Improving Exact Algorithms for Finding Optimal Experimental Designs and Test Suites for Test and Evaluation.”
Sponsor: AFOSR. Funding: \$43,353.

REFEREED JOURNAL PUBLICATIONS

Bulutoglu, D. A. and Ryan, K. J., Integer programming for classifying orthogonal arrays, *Australasian Journal of Combinatorics*, Vol. 70, No. 3, pp. 362-385, 2018.

Morales, L. B. and Bulutoglu, D. A., On $E(s_2)$ -optimal supersaturated designs with 20 rows and 76 columns, *Journal of Combinatorial Designs*, Vol. 26, pp. 344-355, 2018.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Bulutoglu, D. A., “Finding the symmetry group of a linear program,” Wright State University, Dayton OH, Feb 2018.

FATHEDDIN, PARISA,

Assistant Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2016 (AFIT/ENC); BS, Belmont University, 2007; PhD, University of Tennessee, Knoxville, 2014. Dr. Fatheddin’s research interests include stochastic partial differential equations, large deviations and applications of modern probability theory to wireless networks and problems related to optics.

FICKUS, MATTHEW C.,

Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2004 (AFIT/ENC); BS, University of Maryland, Baltimore County, 1995; MS, University of Maryland, Baltimore County, 1997; PhD, University of Maryland, College Park, 2001. Dr. Fickus’ research interests include applied harmonic analysis, frame theory, and compressed sensing. Tel. 937-255-3636 x4513, email: Matthew.Fickus@afit.edu

REFEREED JOURNAL PUBLICATIONS

Fickus, M., Jasper, J., and Mixon, D. G., Packings in real projective spaces, *SIAM Journal on Applied Algebra and Geometry* Vol. 2, No. 3, pp. 377-409, Sep 2018.

Fickus, M., Jasper, J., Mixon, D. G., Peterson, J. D., and Watson, C. E., Equiangular tight frames with centroidal symmetry, *Applied Computational Harmonic Analysis* Vol. 44, No. 2, pp. 476–496, Mar 2018.

Fickus, M., Jasper, J., Mixon, D. G., and Peterson, J. D., Tremain equiangular tight frames, *Journal of Combinatorial Theory Ser. A*. Vol. 153, pp. 54-66, Jan 2018.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Fickus, M., “Equiangular tight frames and combinatorial designs,” AMS Spring Central Special Meeting, Special Session on “Recent Advances in Packing,” Ohio State University, Columbus, OH, 18 Mar 2018.

Fickus, M., “Equiangular tight frames that contain regular simplices,” 7th International Conference on Computational Harmonic Analysis, Vanderbilt University, Nashville, TN, 17 May 2018.

GEYER, ANDREW J., Lt Col,

Assistant Professor of Statistics and Deputy Head, Department of Mathematics and Statistics, AFIT Appointment Date: 2014 (AFIT/ENC); BS, North Dakota State University, 2000; MS, Air Force Institute of Technology, 2009; PhD, Air Force Institute of Technology, 2014. Lt Col Geyer’s research interests include design of experiments, combinatorial optimization problems in statistics, statistical performance metrics, and statistical classification

techniques. The tools he uses are integer programming, constraint programming, graph isomorphism rejection, and multivariate statistical analysis. Lt Col Geyer has served as a weather officer in F-16, AH-64, OH-58D, and CH-47 flying units as well in units supporting US Army and Special Operations ground forces. Tel. 937-255-3636 x4584, email: Andrew.Geyer@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Environmental Modeling for Space Launch Support at Patrick AFB, FL.” Sponsor: 45 WS. Funding: \$96,000 – Geyer 26%, White 25%, Hartsfield 25%, Seymour 24%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Haac B. E., Van Besien, R., Jenkins, R., Geyer, A., Diaz, J., and Stein, D., “Current Nutritional Practices and Associated Outcomes in Critically-Ill Trauma Patients,” *Academic Surgical Conference 2018*. Jacksonville, FL, Jan 18, 2018.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Simkin, H., Geyer A., and Magnus, A., “The Human Touch – why Big Data requires Subject Matter Experts,” Joint Special Operations University Symposium – *Thinking About Big Data for the SOF Enterprise*, MacDill AFB, FL, 21 – 23 Feb 2018.

Boone, S. and Geyer, A., “Shortest Path Across Stochastic Network with Correlated Random Arcs,” *Dayton-Cincinnati Aerospace Sciences Symposium*, Dayton, OH, 27 Feb 2018.

Boone, S. and Geyer, A., “Shortest Path Across Stochastic Network with Correlated Random Arcs,” *Air Force Operations Research Symposium*, Wright-Patterson AFB, OH, 14 Mar 2018.

JORDAN, JEREMY D., Lt Col,

Assistant Professor of Statistics, Department of Mathematics and Statistics, AFIT, Appointment Date: 2016 (AFIT/ENC); BA, Aurora University, 2001; MS, Air Force Institute of Technology, 2007; PhD, Air Force Institute of Technology, 2012. Lt Col Jordan’s research interests include combinatorial optimization, decision analysis, network theory and big data analysis. Lt Col Jordan has served as an operations research analyst for operational testing and human research as well as an international program manager for the Air Force Office of Scientific Research. AFIT research center affiliation(s): COA. Tel. 937-255-3636 x4669, email: Jeremy.Jordan@us.af.mil

SPONSOR FUNDED RESEARCH PROJECTS

“Cognitive Architecture for Dynamic Planning of Unmanned Aerial Vehicles.” Sponsor: AFRL/RV. Funding: \$60,000 – Jordan 50%, Steeneck 50%. [COA]

REFEREED JOURNAL PUBLICATIONS

Jordan, J. D. and Weir, J. D., Average Longest Path and Minimum Cost Network Flows with Multiple-Criteria Weights, *Electronic Notes in Discrete Mathematics* Vol. 69, pp. 181-188, 2018.

Ko, S. S., Ozer, M., Toroslu, I. H., Davulcu, H., and Jordan, J., Triadic co-clustering of users, issues and sentiments in political tweets, *Expert Systems with Applications* Vol. 100, pp. 79-94, 2018.

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Jordan, J. D. and Uryasev, S., “New Exceedance Counter with Application to Network_Optimization,” Proceedings of the 2018 *INFORMS International Conference*. A Better World through O.R., Analytics, and AI, P. Maglio and R. Qiu, eds., Paper No. 1819, Jun 2018.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Jordan, J. D., “Operations Research and Data Analytics in Defense: Basic Research Projects and Funding,” *Workshop on Risk Management Approaches in Engineering Applications*, University of Florida, Gainesville, FL, 16 Oct 2017.

Jordan, J. D., “Operations Research and Data Analytics in the Defense Sector,” University of Florida, Industrial & Systems Engineering Graduate Seminar, Gainesville, FL, 20 Apr 2018.

KAPPEDAL, RYAN D., Lt Col,

Assistant Professor of Statistics, Department of Mathematics and Statistics, AFIT Appointment Date: 2014 (AFIT/ENC); BS, United States Air Force Academy, 1999; MS, Air Force Institute of Technology, 2008; PhD, University of Washington, 2014. Lt Col Kappedal was a visiting fellow at the University of Chicago’s Data Science for Social Good Fellowship summer of 2015 and a visiting scientist at Lawrence Livermore National Labs summer of 2016. His research interests include Machine Learning, Big Data, Statistical Genetics, Neuroscience (MRI imaging), Compressed Sensing, Seismic Detection, Gravimetric Detection, and Imagery Feature Selection. He has served as an intelligence officer at various levels and deployed twice in support of Operation Iraqi Freedom.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Brooks, E. and Kappedal, R. “Compressive sampling for phenotype classification” 2017 IEEE International Conference on Bioinformatics and Biomedicine (BIBM), Kansas City, MO, pp. 1857-1863, 16 Nov 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Anderson, P., F., Kappedal, R., and Magana-Zook, S., “Seismic Data Analysis through Multi-Class Classification,” 2017 American Geophysical Union Fall Meeting, New Orleans, LA, 15 Dec 2017.

Semmelmayr, F., Kappedal, R., and Magana-Zook, S., “Dimensional Representation and Gradient Boosting for Seismic Event Classification,” 2017 American Geophysical Union Fall Meeting, New Orleans, LA, 15 Dec 2017.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Kappedal, R., “Data Science in the Department of Defense,” The Data Science Conference, Chicago, IL, 3 May 2018.

LAIR, ALAN V.,

Professor of Mathematics and Head, Department of Mathematics and Statistics, AFIT Appointment Date: 1982 (AFIT/ENC); BA, North Texas State University, 1970; MS, Texas Tech University, 1972; PhD, Texas Tech University, 1976. Dr. Lair’s research interests include parabolic and elliptic partial differential equations, functional analysis, applied mathematics, and nonlinear diffusion. He has published several papers on the properties of solutions of various nonlinear partial differential equations. Tel. 937-255-3636 x4519, email: Alan.Lair@afit.edu

MAGNUS, AMY L.,

Research Assistant Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2017 (AFIT/ENC); BSEE, Rochester Institute of Technology, 1990; MSEE, Air Force Institute of Technology, 1995; PhD, Air Force Institute of Technology, 2003. Dr. Magnus conducts research in distributed intelligence, i.e., the mature work that emerges from human computers teams. Her research combines multiple disciplines including information fusion, near & remote sensing, data analytics, constraint programming, and narrative analysis. Within these disciplines, Dr. Magnus works the seam between sensory organization and natural language processing translating signals to symbols and symbols into stories. Her contributions to artificial intelligence define the computational differences between training and learning; she designs and demonstrates studies where autonomy can be examined as an oscillating signal. AFIT research center affiliation(s): CCR and CSRA. Tel. 937-255-3636 x4454, email: Amy.Magnus@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Distributed Intelligence and the Nature of Mature Work.” Sponsor: AFOSR. Funding: \$150,380 – Magnus 90%, Oxley 10%. [CCR]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Magnus, A. L., “The Mathematics of Spin, Plumbing Our Capacity To Compute,” Ohio Educational Technology Conference, Columbus OH, 13 Feb 2018.

Magnus, A. L., “Active Consent,” 3rd Annual University of Cincinnati Sensors Community Retreat, Cincinnati, OH, 4 Jan 2018.

MORRILL, DANA F., Maj

Assistant Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2018 (AFIT/ENC); BS, Weber State University, 2005; MS, Air Force Institute of Technology, 2013; PhD, Air Force Institute of Technology, 2018. Maj Morrill’s research interests include optical waves, applied mathematics, fluid mechanics, and numerical analysis. Maj Morrill’s current research considers fluid flows induced by high energy lasers. AFIT research center affiliation(s): CDE. Tel. 937-255-3636 x4729, email: Dana.Morrill@afit.edu

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SPONSOR FUNDED RESEARCH PROJECTS

“Fusion in Exploitation of Sensing Technology.” Sponsor: AFOSR. Funding: \$57,420 – Oxley 50%, Schubert Kabban 50%.

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QUINN, DENNIS W.,

Professor Emeritus of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 1974 (AFIT/ENC); BA, Mathematics, University of Delaware, 1969; MS, Applied Mathematics, University of Delaware, 1971; PhD, Applied Mathematics, University of Delaware, 1973. Dr. Quinn's fields of expertise include numerical methods, finite elements, finite differences, integral equation methods, numerical analysis, functional analysis, system identification, and applied mathematics. Dr. Quinn has advised several MS students in modeling toxic chemical exposure. Dr. Quinn has published papers dealing with integral and finite element solutions of acoustic problems, using the telegrapher's equation to model lightning, using the method of characteristics in cancer risk assessment, using the diffusion equation to model diffusion through the skin in pharmacokinetic modeling, and using the boundary element method for moving boundary problems.

REEGER, JONAH A., Maj,

Assistant Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2013 (AFIT/ENC); BS, Mathematical Sciences, United States Air Force Academy, 2007; MA, Computational and Applied Mathematics, Rice University, 2009; PhD, Applied Mathematics, The University of Colorado, Boulder, 2013. Maj Reeger's primary research interests include Taylor series and Padé approximation methods, multi-step methods, optimization and optimal control, radial basis functions, pseudospectral methods, and the Painlevé equations. He has served as an Air Force analytical scientist on the acquisition of an experimental infrared satellite. AFIT research center affiliation(s): CDE.

REYNOLDS, DANIEL E.,

Assistant Professor Emeritus of Statistics, Department of Mathematics and Statistics, AFIT Appointment Date: 1974 (AFIT/ENC); AB, University of Rochester, 1965; MS, Air Force Institute of Technology, 1971; MS, Wright State University, 1983. Mr. Reynolds' research interests include management cybernetics, learning theory, and exploring ways computer graphics can support statistical and mathematical education. In 1989, Mr. Reynolds received Tau Beta Phi's Outstanding Professor Award.

SCHUBERT KABBAN, CHRISTINE M.,

Associate Professor of Statistics, Department of Mathematics and Statistics, AFIT Appointment Date: 2010 (AFIT/ENC); BA, University of Dayton, 1992; MBA, Wright State University, 1994; MS, Wright State University, 1995; PhD, Air Force Institute of Technology, 2005. Dr. Schubert Kabban's research interests include classification techniques, diagnostic testing, ROC curve theory and extensions, human performance, information fusion, modeling and prediction, NDE methods, network analysis, regression and regression extensions, survey design and analysis, and general biostatistics. Dr. Schubert Kabban's current research is in evaluating the performance of classification systems and information-fused systems via ROC methodology, sequential strategies for classification, structural health monitoring of airframes, as well as epidemiological applications to disease prediction and medical diagnostics. Tel. 937-255-3636 x4549, email: Christine.SchubertKabban@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Sequencing Information for Efficient, Accurate Classification.” Sponsor: AFOSR. Funding: \$32,314.

“Analytical Ensembles for Artificial Intelligence.” Sponsor: 711 HPW. Funding: \$31,124 – Schubert Kabban 50%, Miller 50%.

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OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

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SEYMOUR, RICHARD S., Lt Col,

Assistant Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2015 (AFIT/ENC); BS, US Air Force Academy, 2000; MS, Air Force Institute of Technology, 2009; PhD, Air Force Institute of Technology, 2015. Lt Col Seymour's research interests include stochastic process model acceptance techniques and parameter estimation problems. Lt Col Seymour's current research considers the adequacy of a semi-Markov process with respect to the observed data used to fit the process.

SRITHARAN, SIVAGURU S.,

Provost & Vice Chancellor, AFIT Appointment Date: 2015 (AFIT/CL). BSc (Hons.) University of Sri Lanka 1977; MS, University of Washington, 1979; PhD, University of Arizona, 1982. Dr. Sritharan's research interests include control theory, stochastic analysis, functional analysis, and numerical analysis of aerodynamics at all range of Mach numbers and electromagnetics. Dr. Sritharan's current research focuses on mathematical and computational issues relevant to hypersonics, directed energy weapons and autonomy. AFIT research center affiliation(s): CDE. Tel. 937-255-6565 x3315, email: Sivaguru.Sritharan@afit.edu

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Manna, U., Mohan, M., and Sritharan, S., Stochastic non-resistive magnetohydrodynamic system with Levy noise, *Random Operators and Stochastic Equations* Vol. 25, No. 3, pp. 155-194, 2017.

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EDITORSHIPS IN PROFESSIONAL JOURNALS

Member of the Editorial Board, Communications on Stochastic Analysis

Member of the Editorial Board, International Journal of Analysis

UBER, RICHARD P., Capt,

Assistant Professor of Mathematics, Department of Mathematics and Statistics, AFIT, Appointment Date: 2016 (AFIT/ENC); BGS, University of Nebraska Omaha, 2006; MS, Texas A&M University, 2010; PhD, Air Force Institute of Technology, 2016. Capt Uber's current research interests are electromagnetic wave scattering, partial differential equations, computational modeling, structural health monitoring, and machine translation. He has served as an Operations Research Analyst for Headquarters Air Education and Training Command and a Mandarin Language Instructor at the Defense Language Institute Foreign Language Center. Tel. 937-255-3636 x4450, email: Richard.Uber@afit.edu

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OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Uber, R., “Human Language Technology for USAF,” Air University Language, Regional Expertise, and Culture Symposium, Maxwell AFB, AL, 29 Mar 2018.

Uber, R., “Modeling Ultrasonic Wave Scattering from Cracks and Holes in Thin Plates,” National Tsing Hua University Mathematics Department Colloquium, Hsinchu, Taiwan, 8 May 2018.

Uber, R., “Detecting Cracks with Ultrasonic Waves, a Model-Based Approach,” 2018 SIAM Conference on Mathematical Aspects of Materials Science (MS18), Portland, OR, 10 Jul 2018. (Poster)

WHITE, EDWARD D., III,

Professor of Statistics, Department of Mathematics and Statistics, AFIT Appointment Date: 1998 (AFIT/ENC); BS, University of Tampa, 1990; MAS, Ohio State University, 1991; PhD, Texas A&M University, 1998. Dr. White’s research interests include design of experiments, categorical data analysis, biostatistics, and model building.

Tel. 937-255-3636 x4540, email: Edward.White@afit.edu

REFEREED JOURNAL PUBLICATIONS

D’Amico, C., White, E., Ritschel, J., and Kozlak, S., Unmasking cost growth behavior: A longitudinal study, *Defense Acquisition Research Journal* Vol. 25, No. 1, pp. 30-51, Jan 2018.

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Tvaryanas, A. P., Maupin, G. M., White, E. D., Schroeder, V. M., and Mahaney, H. J., The performance of the PHQ-2 and the examination of risks associated with post-deployment depression in Air Force Medical Service Personnel, *Military Psychology* Vol. 29, No. 6, pp. 581-589, 2017.

Alley, S. L., Valencia, V. V., Thal, A. E., and White, E. D., Probabilistic assessment of failure for United States Air Force building systems, *Journal of Performance of Constructed Facilities* Vol. 31, No. 5, 04017088-1 to 04017088-10, 2017.

Maupin, G. M., Tvaryanas, A. P., White, E. D., Lysfjord, H. J., and Schroeder, V. M., The performance of the AUDIT-C and the examination of risks associated with post-deployment alcohol misuse in Air Force Medical Service Personnel, *Military Psychology* Vol. 29, No. 4, pp. 327–335, 2017.

Atkinson, A., Hill, R., Pignatiello, J., Vining, G. White, E., and Chicken, E., Wavelet ANOVA approach to model validation, *Simulation Modelling Practice and Theory* Vol. 78, pp. 18-27, 2017.

WOOD, AIHUA W.,

Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 1994 (AFIT/ENC); BS, Peking University, 1984; MS, University of Connecticut, 1988; PhD, University of Connecticut, 1990. Dr. Wood's research interests include partial differential equations, electromagnetic wave propagation, and Boltzmann equations. Tel. 937-255-3636 x4272, email: Aihua.Wood@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Fast Methods for the Boltzmann Equation.” Sponsor: AFOSR. Funding: \$49,815.

REFEREED JOURNAL PUBLICATIONS

Charnley, M. and Wood, A., A linear sampling method for through-the-wall radar detection, *Journal of Computational Physics* Vol. 347, pp. 147-159, Oct 2017.

Alekseenko, A., Ngyen, T., and Wood, A., A deterministic-stochastic method for computing the Boltzmann collision integral in $O(MN)$ operations, *Kinetic and Relative Models* Vol. 11, No. 5, pp. 1211-1234, May 2018.

5.5. DEPARTMENT OF OPERATIONAL SCIENCES

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5.5.1	<u>DOCTORAL DISSERTATIONS</u>	149
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5.5.1. DOCTORAL DISSERTATIONS

LESSIN, AARON M., Multi-Level Multi-Objective Programming and Optimization for Integrated Air Defense System Disruption AFIT/ENS/DS/18S-035. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: N/A.

WEIMER, CHRISTOPHER W., Generating Strong Diversity of Opinions: Agent Models of Continuous Opinion Dynamics AFIT/ENS/DS/18S-044. Faculty Advisor: Dr. John O. Miller. Sponsor: 711 HPW/RH. [COA]

LITTLE, ZACHARY C., Experimental Designs, Meta-modeling, and Meta-learning for Mixed-Factor Systems with Large Decision Spaces. AFIT/ENS/DS/18M-137. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AFLCMC. [COA]

RANLY, NEIL C., Methods to Support the Project Selection Problem with Non-Linear Portfolio Objectives, Time Sensitive Objectives, Time Sensitive Resource Constraints, and Modeling Inadequacies AFIT/ENS/DS/18S-040. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AFMC. [COA]

SALGADO, ETHAN L., The Military Inventory Routing Problem: Utilizing Heuristics Within a Least Squares Temporal Differences Algorithm to Solve a Multiclass Stochastic Inventory Routing Problem with Vehicle Loss AFIT/ENS/DS/18S-042. Faculty Advisor: Lt Col Matthew J. Robbins. Sponsor: TRADOC.

5.5.2. MASTER'S THESES

ALMANNAEI, KHALED A., Operational Squadron Scheduling AFIT/ENS/MS/18S-029. Faculty Advisor: Maj Andrew J. Geyer. Sponsor: 28 OWS.

ALTOWIARQI, MAJED M., Evaluation of RSAF Airworthiness and Applicability AFIT/ENS/MS/18S-079. Faculty Advisor: Dr. William A. Cunningham. Sponsor: N/A.

ALVAREZ, JOSE A., Analysis of Argentine A-4AR Aircraft Availability. AFIT/ENS/MS/18M-100. Faculty Advisor: Lt Col Jason J. Anderson. Sponsor: Direccion General de Material.

BEIGHTEL, RACHAEL S., How a Conducive Environment Combined and Susceptible Followers Influence Toxic Leadership Behaviors in the Air Force: An Examination of the Toxic Triangle Theory. AFIT/ENS/MS/18M-102. Faculty Advisor: Col Matthew A. Douglas. Sponsor: N/A.

BIHANSKY, THOMAS S., Resilient Aircraft Maintenance Constructs: Enhancing Repair Network Designs to Effectively Manage Risks and Supply Chain Disruptions. AFIT/ENS/MS/18M-104. Faculty Advisor: Dr. Daniel W. Steeneck. Sponsor: N/A. [COA]

BET, NOLAN R., Examining Disconnects Between Air Force Manpower Funding and Manpower Execution. AFIT/ENS/MS/18M-103. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: HQ USAF/A1.

BOBIC, BENJAMIN D., Flight line Heroics and the Façade of a Healthy Common Support Equipment Fleet. AFIT/ENS/MS/18M-106. Faculty Advisor: Dr. Daniel W. Steeneck. Sponsor: AFMC.

BOHALL, DUSTIN D., A Study of the F-35 Sustainment Strategy: Fiscal Implications of Participant Secession. AFIT/ENS/MS/18M-108. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AF F-35A IO. [COA]

BOOTHE, MELVIN K., Shop Around: An Experiment on Air Force Vehicle Parts Procurement. AFIT/ENS/MS/18M-110. Faculty Advisor: Col Matthew A. Douglas. Sponsor: N/A.

BRANTLEY, LUKE M., Looking Past the Spark to Find the Fuel of the Arab Spring Fire. AFIT/ENS/MS/18M-111. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: N/A.

BRYAN, SAMANTHA R., Band of Brothers. AFIT/ENS/MS/18M-112. Faculty Advisor: Col Matthew A. Douglas. Sponsor: 563 RG.

BUTT, SPENCER A., Cyber Data Anomaly Detection Using Autoencoder Neural Networks. AFIT/ENS/MS/18M-113. Faculty Advisor: Dr. Bradley C. Boehmke. Sponsor: ARCYBER. [COA]

CASEY, JOSHUA P., C-130J Inventory Control Point Location Determination. AFIT/ENS/MS/18M-114. Faculty Advisor: Dr. William A. Cunningham. Sponsor: AFLCMC.

CLEMENTS, BRANDON M., They're Only Nuclear Weapons: An Exploratory Study of Safety Climate within the Nuclear Enterprise. AFIT/ENS/MS/18M-116. Faculty Advisor: Col Matthew A. Douglas. Sponsor: AFSEC.

DEEHR, JOSH D., Improving Personnel Selection Through Value Focused Thinking. AFIT/ENS/MS/18M-117. Faculty Advisor: LTC Christopher M. Smith. Sponsor: AFSOC.

ELLIOTT, JACOB T., Air Force Officer Attrition: An Econometric Analysis. AFIT/ENS/MS/18M-118. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: HQ AF.

FINNEY, DANIEL S., Aircraft Availability: Maintenance Inputs and Acquisition Decisions. AFIT/ENS/MS/18M-120. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: AFMC. [COA]

FROOM, CHELSEA T., Liner Workload Forecasting Augmented by Non-Traditional Data Sources. AFIT/ENS/MS/18M-121. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: USTRANSCOM. [COA]

FURRER, SARAH K., Simulating B-2 Heavy Maintenance Polices Driven by Low Observable Maintenance Management to Determine Future Fleet Health. AFIT/ENS/MS/18M-122. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AFLCMC. [COA]

GALLAGHER, JAMES C., Market Basket Analysis with Shortened Web Link Click Data. AFIT/ENS/MS/18M-123. Faculty Advisor: LTC Christopher M. Smith. Sponsor: ARCYBER. [COA]

GREEN, PRESTON A., Where the HEL?: Optimal Asset Location for High Energy Laser Defense of High Value Assets. AFIT/ENS/MS/18M-124. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: AFRL/RD.

HERALD, RACHEL E., The Africa First Initiative and Local Procurement. AFIT/ENS/MS/18M-126. Faculty Advisor: Maj Timothy W. Breitbach. Sponsor: N/A.

HESTER, MICHAEL J., Supply Chain Financial Analysis in Support of Development Objectives. AFIT/ENS/MS/18M-127. Faculty Advisor: Maj Timothy W. Breitbach. Sponsor: N/A.

HOLLIGER, THEODORE S., Strategic Sourcing Via Category Management: Helping Air Force Installation Contracting Agency Eat One Piece of the Elephant. AFIT/ENS/MS/18M-128. Faculty Advisor: Dr. Bradley C. Boehmke. Sponsor: AFICA. [COA]

KALLHOFF, IVAN J., An Open Source Approach to Social Media Data Gathering. AFIT/ENS/MS/18M-130. Faculty Advisor: Dr. Bradley C. Boehmke. Sponsor: N/A.

KEENE, IVAN G., Optimal Recovery of Critical Infrastructures after a Nuclear Attack. AFIT/ENS/MS/18M-131. Faculty Advisor: Dr. Richard F. Deckro. Sponsor: DTRA.

KUBALEK, SCOTT M., Finding an Optimal Theater Ammunition Distribution Strategy for United States Air Force in Europe. AFIT/ENS/MS/18M-132. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: USAFE. [COA]

LANE, STEVEN T., Flexibility - Designing for Optionality on Warehouse Modernization Projects. AFIT/ENS/MS/18M-133. Faculty Advisor: Maj Timothy W. Breitbach. Sponsor: DLA.

LANKOW, ANDREW J., A Surprising Symbiosis: Examining the Mutualism in Department of Defense Conservation Partnerships. AFIT/ENS/MS/18M-134. Faculty Advisor: Capt Benjamin T. Hazen. Sponsor: N/A. [COA]

LEUNG, BENJAMIN W., CRAF and Organic Air Movements Costing by Route Selection. AFIT/ENS/MS/18M-135. Faculty Advisor: Col Adam D. Reiman. Sponsor: AMC.

LINDELL, JACOB R., Parametric Survival Analysis of US Air Force Rated Officer Retention. AFIT/ENS/MS/18M-136. Faculty Advisor: Dr. Seong-Jong Joo. Sponsor: HQ USAF/A1.

MACIAS, MIGUEL J., Scheduling Tool for the Nevada Test and Training Range. AFIT/ENS/MS/18M-138. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: 57 OSS. [COA]

MACKINNON, FRANCES G., A System Dynamics Innovation Diffusion Model Applied to Carbon Nanotube Manufacturing. AFIT/ENS/MS/18M-139. Faculty Advisor: Dr. Richard F. Deckro. Sponsor: N/A.

MARD, RICHARD E., Modeling Water Security Issues Affecting Potential Migration and Conflict in Iran. AFIT/ENS/MS/18M-140. Faculty Advisor: Dr. Richard F. Deckro. Sponsor: USSOCOM.

MAURO, MICHAEL D., A Tale of Two Programs: The Quest for a Replacement Helicopter for Combat Rescue. AFIT/ENS/MS/18M-141. Faculty Advisor: Dr. Seong-Jong Joo. Sponsor: N/A.

MCEVOY, LINDSEY N., A Study of Military Health Care Costs: Direct Versus Purchased Care in a Geographical Region. AFIT/ENS/MS/18M-143. Faculty Advisor: Maj Heidi Tucholski. Sponsor: AFMOA. [COA]

MCLANE, MICHAEL P., Cultivating Agile Organizational Culture: Addressing Resistance to Change In Bureaucratic Government Organizations. AFIT/ENS/MS/18M-145. Faculty Advisor: Col Matthew A. Douglas. Sponsor: AFSC.

MCCLURE, GORDON M., Schedule Optimization and Simulation for the F-16 Service Life Extension Program AFIT/ENS/MS/18S-036. Faculty Advisor: Dr. John O. Miller. Sponsor: AFSC. [COA]

MERT, HUSEYIN, Flightline Simulation Modeling of a Squadron AFIT/ENS/MS/18S-038. Faculty Advisor: Dr. John O. Miller. Sponsor: TuAF. [COA]

MESSER, BRETT J., Thesis Title: DoD Resource Sharing: USAFRICOM & USEUCOM Forces AFIT/ENS/MS/18S-039. Faculty Advisor: Capt Benjamin T. Hazen. Sponsor: N/A. [COA]

MUNSON, EVAN L., Sentiment Analysis of Twitter Data. AFIT/ENS/MS/18M-148. Faculty Advisor: LTC Christopher M. Smith. Sponsor: N/A. [COA]

NEUMANN, SARAH E., Forecasting Country Conflict within Modified Combatant Command Regions Using Statistical Learning Methods. AFIT/ENS/MS/18M-149. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: JCS.

NOBLE, CLIFTON M., Simulating Aircraft Availability in a Combat Environment Considering Logistics. AFIT/ENS/MS/18M-150. Faculty Advisor: Dr. John O. Miller Sponsor: AFMC. [COA]

OWENS, CASEY L., Not All Tons are Created Equal: Analyzing Aerial Port Capability to Define the Working Ton. AFIT/ENS/MS/18M-151. Faculty Advisor: Lt Col Jason J. Anderson. Sponsor: AMC.

PAK, Investigating Capability Development Management for the Air Force Strategic Development Planning & Experimentation (SDPE) Office AFIT/ENS/MS/18M-152. Faculty Advisor: LTC Christopher M. Smith. Sponsor: HQ USAF SDPE.

PANG, SAMUEL H., Critical Issues in the Air Force Medical Equipment Procurement Process. AFIT/ENS/MS/18M-153. Faculty Advisor: Maj Timothy W. Breitbach. Sponsor: AFMOA.

PRATT, JOSIAH J., Higher Order Effects of Fielding the New ICBM Gas Transfer System. AFIT/ENS/MS/18M-154. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AFGSC. [COA]

RAMIREZ, RACHEL C., Characterization of Ambient Noise. AFIT/ENS/MS/18M-155. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: 711 HPW/RH.

RODRIGUEZ, FRANCISCO J., Assessing the Reliability of the B-1B Lancer Using Survival Analysis. AFIT/ENS/MS/18M-156. Faculty Advisor: Dr. Seong-Jong Joo. Sponsor: N/A.

ROSADO-MEDINA, LUIS D., Evaluating the Air Force Inspection System. AFIT/ENS/MS/18M-157. Faculty Advisor: Maj Timothy W. Breitbach. Sponsor: N/A.

SCHOENBECK, JOSEPH E., The Developmental Test Scheduling Problem. AFIT/ENS/MS/18M-160. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: N/A. [COA]

SEVIER, WILLIAM C., Text Classification of Installation Support Contract Topic Models for Category Management. AFIT/ENS/MS/18M-161. Faculty Advisor: Dr. Bradley C. Boehmke. Sponsor: AFICA. [COA]

SMALL, MATTHEW T., Predicting Global Disposition of US Military Personnel via Open-Source, Unclassified Means. AFIT/ENS/MS/18M-162. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: USTRANSCOM. [COA]

SMITH, JEFFREY R., The Application of Text Mining and Data Visualization Techniques to Textual Corpus Exploration. AFIT/ENS/MS/18M-163. Faculty Advisor: LTC Christopher M. Smith. Sponsor: N/A. [COA]

THOMAS, JESSICA M., A Study of Collaboration between the Defense Logistics Agency and the US Agency for International Development in the Conduct of Humanitarian Operations. AFIT/ENS/MS/18M-164. Faculty Advisor: Col Matthew A. Douglas. Sponsor: DLA.

TRIGO, ALEXANDER M., Outlier Classification Criterion for Multivariate Cyber Anomaly Detection. AFIT/ENS/MS/18M-166. Faculty Advisor: Dr. Bradley C. Boehmke. Sponsor: ASC. [COA]

UHORCHAK, NICHOLAS M., Analysis of Incomplete SOCOM Selection Data. AFIT/ENS/MS/18M-167. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: AFSOC.

WEBER, MICHAEL J., Managing Supply Discrepancies: The Effect of Performance Measurement and Feedback on Order Fulfillment Quality. AFIT/ENS/MS/18M-168. Faculty Advisor: Dr. Daniel W. Steeneck. Sponsor: AFMC.

WILKINSON, KYLE S., Analysis of a Voting Method for Ranking Network Centrality Measures on a Node-aligned Multiplex Network. AFIT/ENS/MS/18M-170. Faculty Advisor: Dr. Richard F. Deckro. Sponsor: N/A.

WILLIAMS, PETER J., Aerial Port of the Future: Developing Paperless Operations. AFIT/ENS/MS/18M-171. Faculty Advisor: Col Matthew A. Douglas. Sponsor: AMC.

YORK, NICOLE B., Comparing Organizational Structures via Alternative Cooperative Game Theoretic Frameworks. AFIT/ENS/MS/17D-012. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: AFMC.

5.5.3. GRADUATE RESEARCH PAPERS

BEAUDOIN, DAVID J., Needs Assessment for IRBMS in US Nuclear Deterrence AFIT/ENS/MS/18J-012. Faculty Advisor: LTC Christopher M. Smith. Sponsor: N/A.

CANNONE, ANTHONY J., Executive Airlift Fleet Size After C-20 Retirement AFIT/ENS/MS/18J-015. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: N/A. [COA]

CARLSON, MICHAEL M., A Multi Criteria Decision Making Model for Air Force Enterprise Information Technology Sourcing Decisions AFIT/ENS/MS/18J-016. Faculty Advisor: Capt Benjamin T. Hazen Sponsor: SAF. [COA]

CARMEAN, DOUGLAS W., Linking Airmen to the Mission through Operations: Helping the Air Force Rediscover its Identity AFIT/ENS/MS/18J-017. Faculty Advisor: Dr. Melvin G. Deaile. Sponsor: N/A.

CHAMBERLIN, SHAWN M., Left of Launch: Deterring Tomorrow's Transformative Drone Threat AFIT/ENS/MS/18J-018. Faculty Advisor: Lt Col Jason J. Anderson. Sponsor: AFGSC.

CRISS, ALEXANDER G., Circadian Rhythm Disruption: A Comparative Analysis of Enumeration for the Mobility Air Force AFIT/ENS/MS/18J-019. Faculty Advisor: Lt Col Jason J. Anderson. Sponsor: AMC.

GILLILAND, KIEL R., Never Lost Sight of What's Important: The Strategy and Way Ahead for Improving In-Transit Visibility (ITV) for US Army Deployments AFIT/ENS/MS/18J-022. Faculty Advisor: Dr. William A. Cunningham. Sponsor: AFSOC.

GLOVER, ADAM J., The Aviation Technical Track: A Cure to the Air Force Pilot Shortage? AFIT/ENS/MS/18J-023. Faculty Advisor: Lt Col Jason J. Anderson. Sponsor: AMC.

GOETZ, CHARLES W., Threshold-Graphing: A Model for Predicting Escalation Events AFIT/ENS/MS/18J-024. Faculty Advisor: Lt Col Jason J. Anderson. Sponsor: N/A.

GROVER, JUSTIN R., Meta-Analysis of Human Causal Factors in United States Submarine Force Collision Near Misses AFIT/ENS/MS/18J-025. Faculty Advisor: Dr. Melvin G. Deaile. Sponsor: COMSUBRU 9.

GUTIERREZ, JAMES L., Analysis of the Minuteman III to Ground Based Strategic Deterrent Transition AFIT/ENS/MS/18J-026. Faculty Advisor: Dr. William A. Cunningham. Sponsor: N/A.

HANNIGAN, JOSEPH A., Signaling Theory and Deterrence: Filling the Escalation Dominance Gap AFIT/ENS/MS/18J-027. Faculty Advisor: Dr. Melvin G. Deaile. Sponsor: N/A.

HAVKO, ANDREW C., Military Flight Operations Quality Assurance (MFOQA) Derived Fuel Modeling for the C-17 AFIT/ENS/MS/18J-028. Faculty Advisor: Col Adam D. Reiman. Sponsor: AMC.

HERSHEY, MICHAEL Z., C-17 Scenario-Based Training: Case Study Analysis AFIT/ENS/MS/18J-029. Faculty Advisor: Col Adam D. Reiman. Sponsor: AMC.

KOETHER, STEPHEN J., Rapid Global Mobility through Space AFIT/ENS/MS/18J-033. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: AMC.

LAD, NIRAV D., Utilizing Sources Of Airlift Channel Variability To Predict Time Definite Delivery AFIT/ENS/MS/18J-034. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AMC. [COA]

LANDIN, THERESE C., Training How We Fight: A Case Study of Mobility Guardian 2017 AFIT/ENS/MS/18J-035. Faculty Advisor: Lt Col Jason J. Anderson. Sponsor: AMC.

LARAS, FRANK S., Redefining Force Structures and Joint Training: Pope Army Airfield's Commitment to the Rapid Global Mobility of the 82nd Airborne Division AFIT/ENS/MS/18J-036. Faculty Advisor: Maj Matthew Roberts. Sponsor: AMC.

MARTIN, ANDRIA K., Effects Caused by Radioactive Isotope Release from Damaged Spent Nuclear Fuel Assemblies AFIT/ENS/MS/18J-037. Faculty Advisor: Dr. John W. McClory. Sponsor: AFNWC.

MCGUIRE, DANIEL P., Forecasting the Future of Logistics: The Formulation of an Internet of Things Capability Index AFIT/ENS/MS/18J-040. Faculty Advisor: Dr. Paul L. Hartman Sponsor: HQ USAF/A4. [COA]

MODAD, ROBBY J., ICBM Technologies to Counter Adversary Nuclear Threats AFIT/ENS/MS/18J-043. Faculty Advisor: Capt Benjamin T. Hazen Sponsor: N/A. [COA]

SARGENT, BROCK D., Tweeting Assurance: Korean Perceptions of President Trump's Tweets AFIT/ENS/MS/18J-048. Faculty Advisor: Dr. Melvin G. Deaile. Sponsor: 8 AF/CC.

SPRYS, JAMES C., Pilot Training Next: A Case Study for Air Mobility Command AFIT/ENS/MS/18J-050. Faculty Advisor: Col Matthew A. Douglas. Sponsor: AMC.

SUNDMAN, JONATHAN E., Evaluating the Efficacy of Emerging Technologies to Increase the Lethality of Nuclear Transportation Security Forces AFIT/ENS/MS/18J-053. Faculty Advisor: Capt James E. Bevins. Sponsor: N/A.

WHITE, GREGORY C., If South Korea Wanted Nuclear Weapons: A Social Exchange Theory View AFIT/ENS/MS/18J-055. Faculty Advisor: Dr. Melvin G. Deaile. Sponsor: N/A.

5.5.4. FACULTY BIOGRAPHIES & RESEARCH OUTPUT

Notes: Research Center affiliations are listed in [] if applicable. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

AHNER, DARRYL K.,

Associate Professor of Operations Research, Department of Operational Sciences, AFIT Appointment Date: 2010 (AFIT/ENS); Director, Scientific Test and Analysis (STAT) for Test and Evaluation (T&E) Center of Excellence, Appointment Date: 2012; BS, Mechanical Engineering, United States Military Academy, 1990; MS, Applied Mathematics, Rensselaer Polytechnic Institute, 1999; MS, Operations Research & Statistics, Rensselaer Polytechnic Institute, 1999; PhD, Systems Engineering, Boston University, 2005. Dr. Ahner's research interests include dynamic programming, optimization of stochastic models, test and evaluation, software testing, information theory, and military operations research applications. Dr. Ahner is a licensed Professional Engineer in the Commonwealth of Virginia. Dr. Ahner is Vice President - Professional Development, Military Operations Research Society. Tel. 937-255-6565 x4708, email: Darryl.Ahner@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Experimental Design and Analysis Methodology Development.” Sponsor: NASIC. Funding: \$47,790 – Ahner 50%, Parson 50%.

“Experimental Design and Analysis Methodology Development II.” Sponsor: NASIC. Funding: \$270,000.

“Test and Evaluation Center of Excellence.” Sponsor: OSD. Funding: \$360,520.

“Joint Live Fire T&E Analysis of Methodologies.” Sponsor: OSD. Funding: \$159,000.

“T-6 Subject Matter Expertise Engineering Support.” Sponsor: AFLCMC. Funding: \$500,000.

“F-35 Scientific Test and Analysis Techniques Test Support.” Sponsor: AFLCMC. Funding: \$247,000 – Ahner 50%, Parson 50%.

REFEREED JOURNAL PUBLICATIONS

Ahner, D., Wisnowski, J., & Simpson, J. R., “Automated software testing in the DoD: current practices and opportunities for improvement,” *Journal of Defense Analytics and Logistics*, Vol. 1, No. 1, pp. 88-91, 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Alexander G. Kline, William N. Caballero, and Darryl K. Ahner, “False Optimality of Integer Programs with Exponential Decision Variables,” 2018 IISE Annual Conference, Orlando, FL, 19-22 May 2018.

Alexander G. Kline and Darryl K. Ahner, “Estimating Parameters of Partially Observable Queues,” 2018 IISE Annual Conference, Orlando, FL, 19-22 May 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Andrew Keith and Darryl Ahner, “Operations Assessment Planning with Markov Decision Processes,” Military Operations Society Symposium 2018, Monterey, CA, 18-21 Jun 2018.

Alexander Kline and Darryl Ahner, “Real-Time Heuristic Algorithms for the Static Weapon-Target Assignment Problem,” Military Operations Society Symposium 2018, Monterey, CA, 18-21 Jun 2018.

Alexander Kline and Darryl Ahner, “A Greedy Hungarian-Like Algorithm for the Static Weapon-Target Assignment Problem,” Military Operations Society Symposium 2018, Monterey, CA, 18-21 Jun 2018.

Andrew Keith and Darryl Ahner, "Higher Order Uncertainty Models," Air Force Operations Research Symposium 2018, Dayton, OH, 13-14 Mar 2018.

Jennifer Thompson and Darryl Ahner, "Development of Composite Indices and a Comparative Regional Assessment Framework for Analyzing Nation-State Health," Military Operations Research Society (MORS) Analytic Support to Contingency/Named Operations Workshop, Tampa, FL, 26 Feb – 2 Mar 2018.

Nicholas Shallcross and Darryl Ahner, "A Logistic Regression and Markov Chain Model for the Prediction of Nation-State Violent Conflicts and Transitions," Military Operations Research Society (MORS) Analytic Support to Contingency/Named Operations Workshop, Tampa, FL, 26 Feb – 2 Mar 2018.

Luke Brantley and Darryl Ahner, "Looking Past the Spark to Find the Fuel of the Arab Spring Fire: Long-term Conflict Prediction Following Initial Shock," Military Operations Research Society (MORS) Analytic Support to Contingency/Named Operations Workshop, Tampa, FL, 26 Feb – 2 Mar 2018.

Sarah Neumann and Darryl Ahner, "The Effects of Water Scarcity from Climate Change and Spreading Conflict on Predicting a Country's Stability," Military Operations Research Society (MORS) Analytic Support to Contingency/Named Operations Workshop, Tampa, FL, 26 Feb – 2 Mar 2018.

Sarah Neumann and Darryl Ahner, "Forecasting Country Conflict within the Combatant Commands using Statistical Learning Methods," Military Operations Research Society (MORS) Analytic Support to Contingency/Named Operations Workshop, Tampa, FL, 26 Feb – 2 Mar 2018.

Darryl Ahner, "Challenges for Future Intel Predictive Analysis," Military Operations Research Society (MORS) Analytic Support to Contingency/Named Operations Workshop, Tampa, FL, 26 Feb – 2 Mar 2018.

Andrew Keith and Darryl Ahner, "Robust Analysis of Unobservable Queues," Decision Sciences Institute (DSI) Annual Meeting 2017, Washington, DC, 14-17 Nov 2017.

Andrew Keith and Darryl Ahner, "Robust Analysis of Unobservable Queues," Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting, Houston, TX, 21-25 Oct 2017.

Alexander Kline and Darryl Ahner, "A Heuristic and Metaheuristic Approach to the Static Weapon-Target Assignment Problem," Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting, Houston, TX, 21-25 Oct 2017.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Ahner, D., Parson, C., Thompson, J., and Rowell, W., "Overcoming the Challenges in Test and Evaluation of Autonomous Robotic Systems," *International Test and Evaluation Journal*, Vol. 39, No. 2, Jun 2018.

ANDERSON, JASON R., Lt Col,

Assistant Professor of Logistics and Supply Chain Management and Deputy Department Head, Department of Operational Sciences, AFIT Appointment Date: 2016 (AFIT/ENS); Program Manager of Advanced Study of Air Mobility (ASAM) and School for Advanced Nuclear Deterrence Studies (SANDS), 2016; BS, Operations Research, United States Air Force Academy, 2000; MS, Masters of Science and Administration, Central Michigan University, 2007; MS, Masters of Logistics and Supply Chain Management, Air Force Institute of Technology, 2013; PhD, Logistics and Supply Chain Management, Air Force Institute of Technology. Lt Col Anderson's research interests include transportation, logistics management, inventory, operations management, simulation, and sourcing. Tel. 937-255-6565 x4533, email: Jason.Anderson@afit.edu

REFEREED JOURNAL PUBLICATIONS

Anderson, Jason R., William Cunningham, Seong Joo, "Examining the Economic Impacts of the Increased Fuel Efficiency Standards on State Gas-Tax Revenues," *Journal of Accounting and Finance*, Vol. 18, No. 6, pp. 10-23, 2018.

Anderson, J. R., Ogden, J. D., Cunningham, W. A., & Schubert-Kabban, C., “An exploratory study of hours of service and its safety impact on motorists,” *Transport Policy*, Vol. 53, pp. 161-174, 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Maj Matthew Roberts, Col Matthew Douglas, Dr. Robert Overstreet, Dr. Jeffrey Ogden, Dr. Jason Anderson, Dr. Dominique Estampe, “The Effects of Safety Climate and ACBS on Operational Performance,” Western Decision Sciences Institute 2018, Kaua’i, HI, 3-6 Apr 2018.

Yong Joo Lee, Lt Col Jason Anderson, “Cost Impact on the Performance of Hospital Operations,” Western Decision Sciences Institute 2018, Kaua’i, HI, 3-6 Apr 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Lt Col Jason Anderson, Dr. Seong Joo, Dr. William Cunningham, “CAFÉ Standards Impact on State Highway Trust Fund,” Western Decision Sciences Institute 2018, Kaua’i, HI, 3-6 Apr 2018.

BOEHMKE, BRADLEY C.,

Assistant Professor of Logistics and Supply Chain Management, Department of Operational Sciences; AFIT Appointment Date: 2017 (AFIT/ENS); Director, Data Science Lab; Director of Research, Center for Operational Analysis; BS, North Dakota State University, 2003; MS, Air Force Institute of Technology, 2011; PhD, Air Force Institute of Technology, 2015. Dr. Boehmke’s research focuses on developing tools and processes that allow supply chain and operations research analysts in the defense industry to extract more insights from their data. AFIT research center affiliation(s): COA.

SPONSOR FUNDED RESEARCH PROJECTS

“Implications of Intellectual Property and Data Rights on Technology Transfer and Small Business Success.” Sponsor: AFRL/SB. Funding: \$200,000 – Boehmke 50%, Hartman 25%, Weir 25%. [COA]

BREITBACH, TIMOTHY W., Maj,

Assistant Professor of Logistics and Supply Chain Management, Department of Operational Sciences; Logistics Division Chief, Department of Operational Sciences, AFIT Appointment Date: 2016 (AFIT/ENS); BA, University of Notre Dame, 2005; MS, Air Force Institute of Technology, 2012; PhD, Massachusetts Institute of Technology, 2017. Dr. Breitbach’s research interests include supply chain finance and data analysis, humanitarian logistics and the role of supply chains in international development, supply chain resilience, and blockchain. Tel. 937-255-3636 x4458, email: Timothy.Breitbach@afit.edu

COX, BRUCE A., Lt Col,

Assistant Professor of Operations Research and Division Chief, Operations Research, Department of Operational Sciences, AFIT Appointment Date: 2018 (AFIT/ENS); BS, Worcester Polytechnic Institute, 1999; MS, Virginia Commonwealth University, 2006; PhD, Georgia Institute of Technology, 2011. Dr. Cox’s research interests include large scale linear and convex optimization, robust optimization, heuristics, and optimal control. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4510, email: Bruce.Cox@afit.edu

CUNNINGHAM, WILLIAM A.,

Professor of Logistics and Supply Chain Management, Department of Operational Sciences; Program Chair, MS in Logistics and Supply Chain Management, Department of Operational Sciences, AFIT Appointment Date: 1994 (AFIT/ENS); BS, Business Administration, Missouri Southern State College, 1976; MS, Economics, Oklahoma State University, 1979; PhD, Economics, University of Arkansas, 1986. Dr. Cunningham’s research interests include strategic mobility, cost/benefit analysis, econometric modeling, costing, privatization and A-76 studies, modal choice, network analysis, location analysis, supply chain management, and RFID. AFIT research center affiliation(s): COA. Tel. 937-255-6565 x4283, email: William.Cunningham@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Development of Mathematical Models to Inform the Location of a Portfolio of Coast Guard District 14 Assets.”
Sponsor: USCG. Funding: \$26,500.

REFEREED JOURNAL PUBLICATIONS

Cunningham, W.A., Anderson, J.R., Joo, S., “Examining the Economic Impacts of the Increased Fuel Efficiency Standards on State Gas-Tax Revenues,” *Journal of Accounting and Finance*, Vol. 18, No. 6, pp. 10-23, 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Cunningham, W.A., Anderson, J. R., Joo, S., “CAFÉ Standards Impact on State Highway Trust Funds,” Western Decision Sciences Institute 2018, Kaua’i, HI, 3-6 Apr, 2018.

Cunningham, W.A. Johnson, A.W., Joo, S., “A Holistic View on Aircraft Availability,” Analysis Support to Enhance Deterrence, The 19th ROK-US Defense Analysis Exchange, Seoul, Korea, 8-11 May, 2018.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editorial Review Board, Journal of Transportation Management

DECKRO, RICHARD F.,

Distinguished Professor of Operations Research, Department of Operational Sciences, AFIT Appointment Date: 1994 (AFIT/ENS); Joint Warfare Analysis Center Chair of Applied Operations Research, and Director, Future Operations Investigation Laboratory, BSIE, State University of New York at Buffalo, 1972; MBA & DBA, Decision Sciences, Kent State University, 1976. Dr. Deckro’s research, teaching, and consultation interests include the areas of information operations and information assurance, behavioral modeling including social network analysis, counter insurgency and irregular warfare, applied mathematical programming and optimization, scheduling, network models, project and program management, modeling and analysis, space applications, campaign modeling, reconstruction and stabilization, measures of effectiveness and assessment, technology selection and management, advanced manufacturing methods, multi-criteria decision making, and decision analysis. Dr. Deckro is a Fellow of the Military Operations Research Society. AFIT research center affiliation(s): CSRA. Tel. 937-255-6565 x4325, email: Richard.Deckro@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Transitioning the Production of Carbon Nanotubes from Development to Economic Viability.” Sponsor: Undisclosed. Funding: \$38,653 – Deckro 50%, Tucholski 50%.

“JWAC AFIT Interaction.” Sponsor: JWAC. Funding: \$150,000 – Deckro 24%, Ahner 18%, Lunday 18%, Meyer 20%.

REFEREED JOURNAL PUBLICATIONS

Fairul Mohd-Zaid, Christine M. Schubert and Richard F. Deckro, “A Test on the L-moments of the Degree Distribution of a Barabási-Albert Network for Detecting Nodal and Edge Degradation,” *Journal of Complex Networks*, Vol. 6, No. 1, pp. 24–53, Feb 2018.

Jared K. Nystrom, Matthew J. Robbins, Richard F. Deckro & James F. Morris, “Simulating attacker and defender strategies within a dynamic game on network topology,” *Journal of Simulation*. DOI:10.1057/s41273-017-0054-0, 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

MAJ Kyle Wilkinson & Richard F. Deckro, "Multilayer "Social Network Rankings: A Voting Theory Application,"" 86th Military Operations Research Symposium, Monterey CA, 18-21 Jun 2018.

Maj Kyle Wilkinson, Richard F. Deckro, Christine Schubert Kabban & James F. Morris, "Using Voting Theory to Analyze Multilayer Networks," Air Force Operations Research Symposium 2018, Wright-Patterson AFB, OH, 13-15 Mar 2018.

Richard F. Deckro & LTC Timothy J Povich, "Using Technology and Operational Research and Analysis to Improve NATO Operations," Houston, TX, 21-25 Oct 2017.

HAZEN, BENJAMIN T., Maj,

Assistant Professor, Logistics and Supply Chain Management, Department of Operational Sciences, AFIT
Appointment Date: 2015 (AFIT/ENS); BS, Business Administration, Colorado Christian University, 2004; MA, Organizational Leadership, Gonzaga University, 2006; MBA, California State University, 2007; PhD, Management, Auburn University, 2012. Maj Hazen's research interests include closed loop supply chains, sustainability, data science, innovation, and supply chain management/information systems interface. AFIT research center affiliation(s): COA. Tel. 937-255-3636 x4337, email: Benjamin.Hazen@afit.edu

REFEREED JOURNAL PUBLICATIONS

Wang, Y., Hazen, B. T., & Mollenkopf, D. A., "Consumer value considerations and adoption of remanufactured products in closed-loop supply chains," *Industrial Management and Data Systems*, Vol. 118, No. 2, pp. 480-498, 2018. [COA]

Wang, Y., Huscroft, J., Hazen, B. T., & Zhang, M., "Green information, green certification, and consumer perceptions of remanufactured automobile parts," *Resources, Conservation & Recycling*, Vol. 128, pp. 187-196, 2018. [COA]

Zhu, S., Song, J. C., Hazen, B. T., Kang, L., & Cegielski, C., "How supply chain analytics enables operational supply chain transparency: An information processing theory perspective," *International Journal of Physical Distribution & Logistics Management*, Vol. 48, No. 1, pp. 47-68, 2018. [COA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Stanton, D.J, Hazen, B.T., & Breitbach, T.W., "Blockchain for supply chain management simulation." 2018 Council of Supply Chain Management Academic Research Symposium, Nashville, TN, 30 Sep – 3 Oct 2018. [COA]

Zacharia, Z. G., Hazen, B.T., Breitbach, T.W., & Mir, S., "Deriving value from and managing customer driven coopetition projects" 2018 Council of Supply Chain Management Academic Research Symposium, Nashville, TN, 30 Sep – 3 Oct 2018. [COA]

EDITORSHIPS IN PROFESSIONAL JOURNALS

Co-Editor, Journal of Defense Analytics and Logistics

Senior Associate Editor, International Journal of Logistics Management

Senior Associate Editor, International journal of Physical Distribution & Logistics Management

Associate Editor, Global Journal of Flexible Systems Management

Guest Editor, International Journal of Logistics: Research & Applications

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Mishra, D., Luo, Z., & Hazen, B. T., “The role of informational and human resource capabilities for enabling diffusion of big data and predictive analytics and ensuing performance,” *In Innovation and Supply Chain Management - Relationship, Collaboration and Strategies*, pp. 283-302, 2018. [COA]

HILL, RAYMOND R.,

Professor of Operations Research, Department of Operational Sciences; Program Chair, Graduate Test and Evaluation Certificate, Director, Science of Test Research Laboratory, Department of Operational Sciences, AFIT Appointment Dates: 1997 (AFIT/ENS); BS, Mathematics, Eastern Connecticut State University, 1983; MS, Operations Research, Air Force Institute of Technology, 1988; PhD, Industrial and Systems Engineering, The Ohio State University, 1996. Dr. Hill’s research interests include applied statistics and data analytics, in particular the application of design of experiments methodologies to test and evaluation; mathematical optimization, in particular the use of heuristic search methods for addressing particularly hard problems; and applied simulation modeling and analysis with particular interests in the area of agent-based modeling and the validation of such models. Tel. 937-255-6565 x7469, email: Raymond.Hill@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“The Science of Test: Advanced Test and Evaluation in Support of the DOD Test and Evaluation Enterprise.”

Sponsor: DOT&E. Funding: \$387,880 – Hill 25%, Stone 25%, Freels 25%, Hodson 25%.

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BOOKS AND CHAPTERS IN BOOKS

Hill, R.R. and Tolk, A., “A History of Military Computer Simulation.” *Advances in Modeling and Simulation: Seminal Research from 50 Years of Winter Simulation Conferences*. Berlin, Germany, A. Tolk, J. Fowler, G. Shao and E. Yucesan, eds., Springer-Verlag, Dec 17, pp. 277-300.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editor, Journal of Defense Analytics and Logistics, 2017-

Associate Editor, Military Operations Research

Associate Editor, Journal of Defense Modeling and Simulation

Associate Editor, Journal of Simulation

Associate Editor, International Journal of Mathematics in Operations Research

Associate Editor, Naval Research Logistics

Associate Editor, Quality Engineering

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Fouts, B., J. Serres, R. Hill, and F. Ciarallo. “Application Development for Optimizing Patient Placement on Aeromedical Evacuation Flights: Proof-of-Concept,” AFRL-SA-WP-TR-2019-0001, 2018.

Atkinson, A. D. and Hill, R. R., “Wavelet Based Model Validation of Functional Data,” Military Operations Research Society Symposium, Monterey, CA, 18-21 Jun 2018.

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JOHNSON, ALAN W.,

Professor of Logistics and Supply Chain Management, Department of Operational Sciences; Program Chair, PhD, Logistics, Department of Operational Sciences, AFIT Appointment Date: 2004 (AFIT/ENS); BS, Mechanical Engineering, Montana State University, 1982; MS, Systems Management, Air Force Institute of Technology, 1989; PhD, Industrial and Systems Engineering, Virginia Polytechnic Institute and State University, 1996. Dr. Johnson’s research interests include space logistics, strategic mobility, discrete-event simulation, logistics management, reliability and maintainability, and discrete optimization and heuristics. AFIT research center affiliation(s): COA. Tel. 937-255-3636 x4703, email: Alan.Johnson@afit.edu

REFEREED JOURNAL PUBLICATIONS

Maywald, J., Reiman, A., Johnson, A., and Overstreet, R., 2018, "Aircraft Selection Modeling: A Multi-Step Heuristic to Enumerate Airlift Alternatives," *Annals of Operations Research*, DOI:10.1007/s10479-018-2933-9, 2018.

JOO, SEONG-JONG,

Associate Professor of Logistics & Supply Chain Management, Department of Operational Sciences; Co-Director, Distance Learning Program, MS, Logistics & Supply Chain Management, Department of Operational Sciences, AFIT Appointment Date: 2016 (AFIT/ENS); BS, Korea Air Force Academy (Seoul, Korea), 1982; MBA, Saint Louis University, 1992; PhD, Saint Louis University, 1995. Dr. Joo's research interests include sourcing, inventory management, transportation, and performance measurement and benchmarking. AFIT research center affiliation(s): COA. Tel. 937-255-6565 x4761, email: Seong-Jong.Joo@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Research, Analysis and Transition Support to the Directorate of Logistics and Sustainment/AFMC." Sponsor: AFMC/A4. Funding: \$350,000 – Joo 40%, Steeneck 25%, Boehmke 20%, Breitbach 5%. [COA]

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SPONSOR FUNDED EDUCATIONAL PROJECTS

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Zunker, C. & Joo, S., "A meta-analysis of leadership effects on employee performance," The POMS 29th Annual Conference, Houston, TX, 5-7 May 2018.

Cotton, J., Joo, S., Schultz, K., & Burns, G., "Antecedents of efficient behavior in automobile drivers," The POMS 29th Annual Conference, Houston, TX, 5-7 May 2018.

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LUNDAY, BRIAN J.,

Associate Professor of Operations Research, Department of Operational Sciences, AFIT Appointment Date: 2016 (AFIT/ENS); BS, Mechanical Engineering, U.S. Military Academy, West Point, 1992; MS, Industrial Engineering, University of Arizona, 2001; PhD, Industrial and Systems Engineering, Virginia Polytechnic Institute, 2010. Dr. Lunday's theoretical research interests include math programming, game theoretic models, and algorithmic design for global optimization, whereas his application research interests include network design, network interdiction, network restoration, facility location, and resource allocation/assignment. Tel. 937-255-3636 x4624, email: Brian.Lunday@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Transportation and Distribution Research." Sponsor: USTRANSCOM. Funding: \$45,000.

"Personnel Recovery Asset Basing in the USAFRICOM AOR." Sponsor: USAFRICOM. Funding: \$8,240.

REFEREED JOURNAL PUBLICATIONS

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EDITORSHIPS IN PROFESSIONAL JOURNALS

Associate Editor, Military Operations Research Journal

MILLER, JOHN O.,

Associate Professor of Operations Research, Department of Operational Sciences; Program Chair, AFIT Appointment Date: 2002 (AFIT/ENS); Director, Combat Modeling Laboratory; BS, Biology, United States Air Force Academy, 1980; MBA, University of Missouri at Columbia, 1983; MS, Operations Research, Air Force Institute of Technology, 1987; PhD, Industrial Engineering, The Ohio State University, 1997. Dr. Miller's research interests include computer simulation, ranking and selection, agent based modeling, combat modeling, network centric warfare, high performance computing, applied statistics, and nonparametric statistics. AFIT research center affiliation(s): COA. Tel. 937-255-6565 x4326, email: John.Miller@afit.edu

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PIGNATIELLO, JOSEPH J.,

Professor of Operations Research, Department of Operational Sciences; Head, Department of Operational Sciences, AFIT Appointment Date: 2010 (AFIT/ENV), 2011 (AFIT/ENS); BS, Mathematics, University of Massachusetts; MS, Industrial and Systems Engineering, The Ohio State University, 1979; PhD, Industrial and Systems Engineering, The Ohio State University, 1982. Dr. Pignatiello serves on the editorial review boards of *Quality Engineering*, *IIE Transactions*, and the *International Journal of Lean Six Sigma*. He is a Fellow of both the American Society for Quality and the Institute of Industrial and Systems Engineers. Tel. 937-255-3636 x4311, email: Joseph.Pignatiello@afit.edu

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EDITORSHIPS IN PROFESSIONAL JOURNALS

Editorial Board, Quality Engineering

Editorial Board, IIE Transactions

Editorial Advisory Board, International Journal of Lean Six Sigma

REIMAN, ADAM D., Col,

Associate Dean of the Graduate School of Engineering and Management and Assistant Professor of Logistics and Supply Chain Management, Department of Operational Sciences, AFIT Appointment Date: 2014 (AFIT/ENS); BS, Astronautical Engineering, US Air Force Academy, 1995; MBA, Military Management, Touro University International, 2006; MS, Logistics Management, Air Force Institute of Technology, 2009; PhD Logistics, Air Force Institute of Technology, 2014. Col Reiman’s research interests include airlift metrics, routing, scheduling, and fuel efficiency; energy efficiency, supply and demand; value-focused thinking, and heuristic search algorithms. Tel. 937-255-3636 x4689, email: Adam.Reiman@afit.edu

REFEREED JOURNAL PUBLICATIONS

Maywald, J. D., Reiman, A. D., Overstreet, R. E., Johnson, A. W., “Aircraft selection modeling: a multi-step heuristic to enumerate airlift alternatives,” *Annals of Operations Research*, pp. 1-21, 2018.

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SMITH, CHRISTOHER M., LTC,

Assistant Professor of Operations Research, Department of Operational Sciences, AFIT Appointment Date: 2016 (AFIT/ENS); BS, Systems Engineering, United States Military Academy, 1997; MS, Engineering Management, Missouri University of Science and Technology, 2002; MS Operations Research, University of Texas – Austin, 2007; PhD, Systems Engineering, University of Virginia, 2013. LTC Smith’s research interests include decision analysis, data science, and social media analysis. AFIT research center affiliation(s): COA. Tel. 937-255-3636 x4318, email: Christopher.Smith@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Summer Program for Operations Research Technology (SPORT), Distinguished Visiting Professor (DVP).” Sponsor: NSA. Funding: \$32,895.

“Africa Logistics Network (ALN).” Sponsor: USAFRICOM. Funding: \$54,600 – Smith 34%, Breitbach 33%, Steeneck 33%. [COA]

“Women and Stability in Western Africa.” Sponsor: USAFRICOM. Funding: \$4,725 – Smith 50%, Breitbach 50%. [COA]

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EDITORSHIPS IN PROFESSIONAL JOURNALS

Guest Editor, Decision Analysis Journal, Special Issue on Decision Analysis

STEENECK, DANIEL W.,

Assistant Professor of Logistics and Supply Chain Management, Department of Operational Sciences; AFIT Appointment Date: 2016 (AFIT/ENS); BS, Virginia Tech, 2008; MS, Virginia Tech, 2009; PhD, Virginia Tech, 2014; Dr. Steeneck’s research areas include mathematical modeling and optimization of supply chain and production systems, statistical modeling and parameter estimation and predictive analytics for machine failure. AFIT research center affiliation(s): COA. Tel. 937-255-6565 x4702, email: Daniel.Steeneck@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Hyperparameter Estimation for Neural Networks Applied to Automatic Target Recognition.” Sponsor: AFRL/R.Y. Funding: \$50,000 – Steeneck 50%, Jordan 50%. [COA]

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Steeneck, D.W., “Estimating Demand When Inventory Records are Unreliable,” Institute for Operations Research and Management Science Annual Meeting, Houston, TX, 22-25 Oct 2017.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Steenneck, D.W., “Supply chain analytics: Current trends and examples,” APICS Dayton Chapter, Fairborn, OH, Sep 2018.

Steenneck, D.W., “Voice of the machine: The supply chain value of failure prediction analytics,” Research Seminar, Stockholm University, Stockholm, Sweden, May 2018.

Steenneck, D.W., “Hidden Markov model for on-shelf availability,” 3rd Annual European Workgroup on Retail Operations, Eindhoven, The Netherlands, May 2018.

TALAFUSE, THOMAS P., Maj,

Assistant Professor of Logistics and Supply Chain Management, Department of Operational Sciences, AFIT Appointment Date: 2017 (AFIT/ENS); BS, Mathematics, United States Air Force Academy, 2007; MS, Operations Research, Air Force Institute of Technology, 2011; PhD, Industrial Engineering, University of Arkansas, 2016. Maj Talafuse’s research interests include reliability, reliability growth, optimization, stochastic processes, design of experiments, applied statistics, and risk analysis. He is a member of the Institute for Operations Research and Management Science (INFORMS) and Institute for Industrial and Systems Engineers (IISE). Tel. 937-255-3636 x4740, email: Thomas.Talafuse@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“COE-S 310/410: Experimental Design and Analysis I &II Short Courses for ROCAF.” Sponsor: SAF/IA. Funding: \$39,000.

TUCHOLSKI, HEIDI M., Maj,

Assistant Professor of Operations Research; Division Chief, Operations Research Division, Department of Operational Sciences, AFIT Appointment Date: 2015 (AFIT/ENS); BS, Operations Research, US Air Force Academy, 2006; MA, Economics, George Mason University, 2008; PhD, Mathematical Behavioral Sciences, University of California, Irvine, 2014. Maj Tucholski’s research interests include decision analysis, incentive theory, statistical data analysis, game theory, behavioral and experimental economics. AFIT research center affiliation(s): COA. Tel. 937-255-3636 x4319, email: Heidi.Tucholski@afit.edu

WEIR, JEFFERY D.,

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SPONSOR FUNDED RESEARCH PROJECTS

“Design of Experiment (DOE) and Meta-modelling support for the ISR Collect and Defeat of Agile and Intelligent Targets (DAIT) programs at the Simulation and Analysis Facility (SIMAF).” Sponsor: AFLCMC. Funding: \$150,000. [COA]

“AFIMSC, RMO Analysis Support.” Sponsor: AFIMSC. Funding: \$450,000. [COA]

“Air Force Inspection Agency (AFIA) Support for UEI Generator.” Sponsor: AFIA. Funding: \$34,000. [COA]

“Value-Driven Tradespace Exploration and Analysis for Resilient Systems.” Sponsor: USA ERDC. Funding: \$100,000. [COA]

“Strategic Development Planning & Experimentation Support: Roadmap for Multi-Domain Modeling, Simulation, Analysis and Experimentation.” Sponsor: SDPE. Funding: \$700,000. [COA]

“Joint Service Explosive Ordnance Disposal (EOD) Technology Capability Based Value Model (CBVM) Support.” Sponsor: NSWC. Funding: \$200,000. [COA]

“Air Force Institute of Technology Center for Operational Analysis (AFIT/COA) Support to Acquisition Intelligence Requirements Task Force (AIRTf) for Intelligence Mission Data (IMD) Cost, Capability Analysis (CCA) (Revised).” Sponsor: OSD. Funding: \$537,047. [COA]

“Design of Experiment (DOE) and Meta-modelling support for the ISR Decision Support at the Simulation and Analysis Facility (SIMAF).” Sponsor: AFLCMC. Funding: \$50,000. [COA]

“AFRL/RX Analytics Implementation and Demonstration.” Sponsor: AFRL/RX. Funding: \$40,000. [COA]

“Sliding Scale Autonomy through Physiological Rhythm Evaluations (SAPHYRE).” Sponsor: OFRN (WSU). Funding: \$109,993. [COA]

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Chu, X, Wu, T, Weir, J D, Shi, Y, Niu, B, Li, L, “Learning–Interaction–Diversification Framework for Swarm Intelligence Optimizers: A Unified Perspective,” *Neural Computing & Applications*, DOI:10.1007/s00521-018-3657-0, 2018.

Jordan, J D, Weir, J D, “Average Longest Path and Maximum Cost Network Flows with Multiple-Criteria Weights,” *Electronic Notes in Discrete Mathematics*, Vol. 69, pp. 181-188, 2018.

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Little, Z C, Weir, J D, Hill, R R, Stone, B B, and Freels, J K, “Comparison of Mixed-factor Space-filling Designs for Meta-model Recommendation Systems,” 2018 IISE Annual Conference, Orlando, FL, 19-22 May 2018.

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REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Ranly, N, Weir, J D, Colombi, J, and Tucholski, H, “Holistic portfolio value functions for the multi-objective project selection problem,” Western Decision Sciences Institute Annual Meeting, Kauai, HI, 3-6 Apr 2018.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Associate Editor, Military Operations Research Journal

Associate Editor, IIE Transactions on Healthcare Systems Engineering

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5.6.1	<u>DOCTORAL DISSERTATIONS</u>	171
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5.6.1. DOCTORAL DISSERTATIONS

ENGLE, RYAN D., A Methodology for Evaluating Relational and NoSQL Databases for Small-Scale Storage and Retrieval AFIT/ENV/DS/18S-047. Faculty Advisor: Dr. Brent T. Langhals. Sponsor: AFOSR.

5.6.2. MASTER'S THESES

ALLEN, TIMOTHY J., Design and Test of a UAV Swarm Architecture over a Mesh Ad-hoc Network. AFIT/ENV/MS/18M-172. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A. [ANT]

APPLEBEE, JOSEPH A., A method to determine the viability of photovoltaic systems in various climate regions. AFIT/ENV/MS/18M-174. Faculty Advisor: Dr. Diedrich V. Prigge. Sponsor: NGB.

BASRAOUI, WALID, Analysis of Merit-Based Observation Scheduling for Geosynchronous Earth Orbit Space Situational Awareness. AFIT/ENV/MS/18M-175. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A. [CSRA]

BATEMAN, MARK G., Optimization of Geosynchronous Earth Orbit and Ascent Vehicle Space Situational Awareness via Parallel Evaluation of Executable Architectures. AFIT/ENV/MS/18M-176. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A. [CSRA]

BENTLEY, WILLIAM E., Evaluating Contingency construction Methods: A Delphi Study. AFIT/ENV/MS/18M-177. Faculty Advisor: Dr. Brent T. Langhals. Sponsor: N/A.

BERRY, JOE R., Characterization of ATD and Human Responses Under -Gz Accelerative Input. AFIT/ENV/MS/18M-178. Faculty Advisor: Lt Col Jeffrey C. Parr. Sponsor: 711 HPW/RH.

BONEY, BIANCA E., Analysis of Cross-Cultural Training Provided to United States Air Force Civil Engineer Officers, and How Engineering Efforts are Affected on Overseas Air Force Installations: A Delphi Study. AFIT/ENV/MS/18M-231. Faculty Advisor: Dr. Diedrich V. Prigge. Sponsor: AFCLC.

BOOKER, COREY J., Analysis of Temperature and Humidity Effects on Horizontal Photovoltaic Panels. AFIT/ENV/MS/18M-180. Faculty Advisor: Dr. Alfred E. Thal. Sponsor: NGB.

BOONE, EVAN R., An Analysis of Learning Curve Theory and the Flattening Effect at the End of the Production Cycle. AFIT/ENV/MS/18M-181. Faculty Advisor: Dr. John J. Elshaw. Sponsor: NPS.

BREUKER, JARED R., Phase Gate Implementation of Project Definition Rating Index (PDRI) on Air Force MILCON Project Development: A Comprehensive Analysis. AFIT/ENV/MS/18M-183. Faculty Advisor: Dr. Diedrich V. Prigge. Sponsor: AFCEC.

BUEHLER, DAVID J., Utilizing Supercomputing to Analyze Risks of An Emergent Large-Scale Debris Field in Low Earth Orbit. AFIT/ENV/MS/18M-184. Faculty Advisor: Col Dane F. Fuller. Sponsor: N/A. [CSRA]

CHAMBERS-MILLS, JOSHUA C., A Comparative Accreditation Alignment Analysis of Civil Engineering and Construction Management Bachelor Degrees with the Skill Requirements for USAF Civil Engineer Officers. AFIT/ENV/MS/18M-225. Faculty Advisor: Dr. Diedrich V. Prigge. Sponsor: N/A.

CIPERA, DANIEL L., Comparison of Traditional Versus CubeSat Remote Sensing: A Model-Based Systems Engineering Approach. AFIT/ENV/MS/18M-187. Faculty Advisor: Dr. David R. Jacques. Sponsor: N/A. [CSRA]

CLARK, SAMUEL M., United States Air Force Applications of Unmanned Aerial Systems: Modernizing Airfield Damage Assessment. AFIT/ENV/MS/18M-188. Faculty Advisor: Dr. David R. Jacques. Sponsor: AFCEC.

COTTON, TARAH E., Improving Decision Support through Storytelling. AFIT/ENV/MS/18M-190. Faculty Advisor: Dr. R. David Fass. Sponsor: SAF/FMCC.

DAVENPORT, ANDREW W., Application of Ultraviolet Light Emitting Diodes for the Advanced Oxidation of Guar Gum. AFIT/ENV/MS/18M-193. Faculty Advisor: Dr. Willie F. Harper. Sponsor: EPA.

DAVIS, MATTHEW W., Cybersecurity Assessment and Mitigation Stochastic Model. AFIT/ENV/MS/18M-194. Faculty Advisor: Lt Col Logan O. Mailloux. Sponsor: AFLCMC.

DENNISON, PAUL P., Understanding And Developing Estimates Based On Practical Foundation Methods For Alaska's Discontinuous Permafrost Region. AFIT/ENV/MS/18M-195. Faculty Advisor: Dr. Diedrich V. Prigge. Sponsor: USACE CRREL.

DUNCAN, BRADLEY M., Air Force Corporate Exposure Assessment Strategy: Underlying Cost Behaviors & Visibility. AFIT/ENV/MS/18M-196. Faculty Advisor: Lt Col Robert M. Eninger. Sponsor: 711 HPW/USAFSAM.

DYSON, SEAN M., Removal of Perfluorinated Compounds from Post-Emergency Wastewater by Advanced Oxidation Process and Granular Activated Carbon Adsorption. AFIT/ENV/MS/18M-197. Faculty Advisor: Lt Col John E. Stubbs. Sponsor: EPA.

EDLUND, CHRISTOPHER A., Quantifying Permafrost Extent, Condition, and Degradation Rates at Department of Defense Installations in the Arctic. AFIT/ENV/MS/18M-198. Faculty Advisor: Dr. Diedrich V. Prigge. Sponsor: USACE CRREL.

ERICKSON, JARED R., Influencing Effective Electrical Distribution Modernization through Advanced Metering. AFIT/ENV/MS/18M-201. Faculty Advisor: Lt Col Jeffrey C. Parr. Sponsor: AFCEC.

FELTEN, MICHAEL S., Optimization of Geosynchronous Space Situational Awareness Architectures using Parallel Computation. AFIT/ENV/MS/18M-202. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A. [CSRA]

FLENAR, KYLE A., Determining Detectable and Exploitable Aspects of Rogue Unmanned Aircraft Systems AFIT/ENV/MS/18J-059. Faculty Advisor: Dr. David R. Jacques. Sponsor: N/A.

HEDDERLY, RYAN W., Increased Capability in Electronic Warfare Systems for Flight Simulators and Laboratory Environments and the Effect on System Performance. AFIT/ENV/MS/18S-048. Faculty Advisor: Lt Col Amy M. Cox. Sponsor: 16 EWS.

HEWITSON, SCOTT C., An Analysis of Stability Properties in Operating and Support Costs for Air Force Aircraft. AFIT/ENV/MS/18M-207. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: AFLCMC.

HORNSTEIN, THOMAS G., Life Cycle Analysis of Waste-to-Energy Conversion Technologies for Contingency DoD Deployed Forces. AFIT/ENV/MS/18M-208. Faculty Advisor: Dr. Jeremy M. Slagley. Sponsor: AFCEC.

HOUSER, CHASE M., Requirements for Cost Analysts. AFIT/ENV/MS/18M-209. Faculty Advisor: Dr. Robert D. Fass. Sponsor: SMC.

IUNGERICH, JUSTIN M., Comprehensive Comparison of Steel Framed Fabric and Conventionally Constructed Aircraft Hangars. AFIT/ENV/MS/18M-211. Faculty Advisor: Dr. Diedrich V. Prigge. Sponsor: AFCEC.

KANIUT, MICHAEL M., Stabilized RPA Flight in Building Proximity Operations. AFIT/ENV/MS/18M-212. Faculty Advisor: Dr. David R. Jacques. Sponsor: N/A.

KUNICKI, JOSEPH B., The Effect of Ammonia on the Germination and Outgrowth of *Bacillus globigii*. AFIT/ENV/MS/18M-217. Faculty Advisor: Dr. Willie F. Harper. Sponsor: EPA.

LEE, KIJUN, Military Application of Aerial Photogrammetry Mapping Assisted by Small Unmanned Air Vehicles. AFIT/ENV/MS/18M-219. Faculty Advisor: Dr. David R. Jacques. Sponsor: N/A. [ANT]

MAESTAS, BRENDAN J., Defining Success in Air Force Infrastructure Asset Management through Use of the Delphi Technique. AFIT/ENV/MS/18M-220. Faculty Advisor: Dr. John J. Elshaw. Sponsor: AFCEC.

MCGAHA, ROBERT J., UAS Applications in Air Force Civil Engineering Squadrons: A Labor Value Study. AFIT/ENV/MS/18M-223. Faculty Advisor: Dr. David R. Jacques. Sponsor: AFCEC.

MCGOWIN, AMANDA L., An Analysis of Major Acquisition Reforms Through Text Mining and Grounded Theory Design. AFIT/ENV/MS/18M-224. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: AFLCMC.

MCCREA, JOHN P., Design of a Zero-Gravity, Vacuum-Based 3D Printer Robot for In-Space Satellite Assembly. AFIT/ENV/MS/18M-221. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: N/A. [CSRA]

MIMS, RAYMOND L., Predicting Agency Contributions for the Federal Employment Retirement System (FERS) Fund. AFIT/ENV/MS/18M-226. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: AFMC.

O'HANLON, GARRETT B., An Analysis of Aircraft Operating and Support Cost Element Structures and Their Contribution to Total Costs. AFIT/ENV/MS/18M-227. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: AFLCMC.

OKAMOTO, JAMES T., Air Force Installation Contracting Agency Category Management through Expenditure Profiling. AFIT/ENV/MS/18M-228. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: AFICA.

PRICE, BRYAN J., Additive Manufacturing: Predicting Costs for DoD Systems. AFIT/ENV/MS/18M-229. Faculty Advisor: Dr. Robert D. Fass. Sponsor: AFRL.

RAMSEY, PHILIP A., Cost and Performance Difference of High Performance Sustainable Buildings. AFIT/ENV/MS/18M-230. Faculty Advisor: Dr. Diedrich V. Prigge. Sponsor: AFCEC.

SANDERS, KEITH A., Radiological Decontamination in the Urban Environment Utilizing an Irreversible Wash-Aid Recovery System. AFIT/ENV/MS/18M-233. Faculty Advisor: Dr. Jeremy M. Slagley. Sponsor: EPA.

SPAN, MARTIN T., Conceptual Systems Security Analysis Aerial Refueling Case Study. AFIT/ENV/MS/18M-237. Faculty Advisor: Lt Col Logan O. Mailloux. Sponsor: N/A.

STUNTZ, SEAN M., The effect of MS2 bacteriophage on the activity and performance of activated sludge. AFIT/ENV/MS/18M-238. Faculty Advisor: Dr. Willie F. Harper. Sponsor: EPA.

TIMME, DANIEL A., Modeling Multimodal Failure Effects of Complex Systems using polyWeibull Distribution. AFIT/ENV/MS/18M-239. Faculty Advisor: Maj Jason K. Freels. Sponsor: OSD.

TRAWICK, JESSE A., Occupational Noise Dose Reduction Via Behavior Modification Using In-Ear Dosimetry Among USAF Personnel Exposed to Continuous and Impulse Noise. AFIT/ENV/MS/18M-240. Faculty Advisor: Dr. Jeremy M. Slagley. Sponsor: 711 HPW/USAFSAM.

TROYA, AUSTIN A., A Study of the Air Force Airworthiness Assessment Process with Recommendations for Reusable Launch Vehicles. AFIT/ENV/MS/18M-241. Faculty Advisor: Lt Col Logan O. Mailloux. Sponsor: N/A.

WAITERS, ARIEL L., Land Cover Influence on Airborne Noise Propagation at USAF Installations. AFIT/ENV/MS/18M-242. Faculty Advisor: Dr. Eric G. Mbonimpa. Sponsor: AFCEC.

YOUNG, SHAUNA M., Analysis of Influences of Separation Decisions in the Financial Management Career Field. AFIT/ENV/MS/18M-243. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: AFLCMC.

5.6.3. FACULTY BIOGRAPHIES & RESEARCH OUTPUT

Notes: Research Center affiliation is listed in [] if applicable. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

BADIRU, ADEDEJI B.,

Dean, Graduate School of Engineering and Management, AFIT Appointment Date: 2013 (AFIT/EN); BS, Tennessee Technological University, 1979; MS, Tennessee Technological University, 1981; PhD, Industrial Engineering, University of Central Florida, 1984. Dr. Badiru's research interests include Project Modeling, Analysis, Management and Control, Mathematical Modeling, Computer Simulation, Information Systems, and Economic Analysis. He is the author of several books and technical journals. Tel. 937-255-3636 x4799, email: Adedeji.Badiru@afit.edu

REFEREED JOURNAL PUBLICATIONS

Badiru, Adedeji B. (2018), "Quality insights: artificial neural network and taxonomical analysis of activity networks in quality engineering," *International Journal of Quality Engineering and Technology*.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Badiru, A. B. and Sharon Bommer (2018), "Integrating Human Cognitive Factors into Applicable Technology using DEJI Systems Model," presented at DESS 2018 (Dayton Engineering Sciences Symposium), Wright State University, 2018.

Badiru, A. B. (2018), "An Integrative Systems Framework for Operational Excellence," IEOM 2018 Washington, DC, 28 September 2018.

Badiru, A. B. (2018), "Technical Innovation: From Lab to Market," Engineering Foundation of Ohio, Ohio Society of Professional Engineers, CPD Conference, Powell, Ohio, 2018.

Badiru, Adedeji B. (2018), "Achieving Sustainable Engineering through an Integrative Systems Engineering Framework," presented at GREENCHEM-18, Green Chemistry and Sustainable Engineering, Complutense University of Madrid, Madrid, Spain, 23 July 2018.

Bommer, Sharon and Adedeji Badiru (2018), "Application of DEJI® Systems Model for Process Improvement," *Proceedings of the 2018 Annual Conference of the Institute of Industrial & Systems Engineers (IISE)*, Orlando, FL, 22 May 2018.

Agustiady, Tina and Adedeji Badiru (2018), "Sustainability Utilizing Lean Six Sigma Techniques," *Proceedings of the 2018 Annual Conference of the Institute of Industrial & Systems Engineers (IISE)*, Orlando, FL, 22 May 2018.

Badiru, Adedeji B. and LeeAnn Racz (2018), "Integrating Systems Thinking in Interdisciplinary Education Programs: A Systems Integration Approach," *Proceedings of the Annual Conference of the American Society for Engineering Education (ASEE)*, Salt Lake City, UT, June 2018.

Bommer, Sharon, Alice Grimes, and Adedeji Badiru (2018), "Application of DEJI® Systems Engineering Model in the Development of a New Faculty Mentoring Program in Higher Education," *Proceedings of the Annual Conference of the American Society for Engineering Education (ASEE)*, Salt Lake City, UT, June 2018.

BOOKS AND CHAPTERS IN BOOKS

Badiru, A.B. (2018), "The Role of Nigerian Tertiary Education System in Global Societal Challenges: A World Systems Perspective," in Afam Icha-Ituma and Chinyere Nwajiuba (Editors), *Effective Teaching and Learning: A Handbook for Educators in Nigerian Universities*, FUNAI Press, pp. 20-41.

Badiru, Adedeji B., S. Abi Badiru, and I. Adetokunboh Badiru, (2018), *Mechanics of Project Management: Nuts and Bolts of Project Execution*, Taylor & Francis/CRC Press, Boca Raton, FL.

Badiru, Adedeji B. (2018), *The Story of Industrial Engineering: The Rise from Shop-Floor Management to Modern Digital Engineering*, Taylor & Francis/CRC Press, Boca Raton, FL.

Badiru, Adedeji B. and Cassie B. Barlow, editors (2018), *Defense Innovation Handbook: Guidelines, Strategies, and Techniques*, Taylor & Francis/CRC Press, Boca Raton, FL.

COLOMBI, JOHN M.,

Associate Professor and Program Chair of Systems Engineering, Department of Systems Engineering and Management, AFIT Civilian Appointment Date: 2008 (AFIT/ENV); BSEE, University of Lowell, 1982; MSEE, Air Force Institute of Technology, 1992; PhD, Electrical Engineering, Air Force Institute of Technology, 1996. Dr. Colombi's research interests within the broad discipline of Systems Engineering include systems architecture and model-based systems engineering techniques, multi-vehicle unmanned/autonomous design, acquisition process modeling, optimal space constellation design, systems of systems analysis, complex adaptive systems and human systems integration. AFIT research center affiliation(s): ANT and CSRA. Tel. 937-255-3636 x3347, email: John.Colombi@afit.edu

SPONSOR FUNDED EDUCATIONAL PROJECTS

"Model-Based Systems Engineering: Theory, Practice and Open Systems Analysis." Sponsor: AFLCMC. Funding: \$150,000.

REFEREED JOURNAL PUBLICATIONS

Stern, J., Wachtel, S., Colombi, J., Meyer, D. and R. Cobb. (2018). Multiobjective Parallel Optimization of Geosynchronous Space Situational Awareness Architectures. *AIAA Journal of Spacecraft and Rockets*. <https://arc.aiaa.org/doi/abs/10.2514/1.A34043>. [CSRA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Neil Ranly, Jeffery Weir, John Colombi and Heidi Tucholski, Information production planning with multiple information users and aging information products, K. Barker, D. Berry, C. Rainwater, eds., *Proceedings of the 2018 IISE Annual Conference*, Orlando Florida, May 2018.

Neil Ranly, Jeffery Weir, John Colombi and Heidi Tucholski, "Holistic Portfolio Value Functions for the Multi-Objective Project Selection Problem, *Western Decision Sciences Institute Proceedings*, Kauai, HI, April 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Michael S. Felten, John M. Colombi, Richard G. Cobb and David W. Meyer, Optimization of Geosynchronous Space Situational Awareness Architectures Using Parallel Computation, *Advanced Maui Optical and Space Surveillance Technologies (AMOS) Conference*, Maui, HI, Sep 2018. [CSRA]

BOOKS AND CHAPTERS IN BOOKS

Colombi, J. "A Framework for Emergence: A Modeling and Simulation Approach," *Sources for Emergence and Development of Systems-of-Systems*, Boca Raton, FL, Larry Rainey (Ed), CRC Press, 2018.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Michael S. Felten, John M. Colombi, Richard G. Cobb, David W. Meyer, Multi-objective optimization using parallel simulation for space situational awareness, *Journal of Defense Modeling and Simulation* <https://doi.org/10.1177/1548512918803212> . [CSRA]

COX, AMY M., Lt Col,

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management, AFIT
 Appointment Date: 2016 (AFIT/ENV); BS, Mechanical Engineering, University of Cincinnati, 1997; MS, Space Operations, Air Force Institute of Technology, 1999; AA French, Presidio of Monterey, 2005; Brevet, Flight Test Engineering, École du Personnel Navigant d'Essais et de Réception, 2006; PhD, Systems Engineering, George Washington University, 2017. Lt Col Cox's research interests include flexible design, system architecture, Small Unmanned Aircraft Systems, experimental flight test user innovation and open innovation. AFIT research center affiliation(s): ANT. Tel. 937-255-3636 x4352, email: Amy.Cox@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Special Operations Forces (SOF) Small Unmanned Aircraft System (SUAS) Concept Research (SSCoR)." Sponsor: AFRL/RQ. Funding: \$150,000 – Cox 40%, Jacques 40%, Colombi 20%. [ANT]

BOOKS AND CHAPTERS IN BOOKS

Page, W., Parr, J., Thal, A. and Cox, A., 2018, "User-Centered Design in U.S Air Force Additive Manufacturing; Case Studies on Tools, Jigs, and Topology Optimization," *Advances in Usability and User Experience*. T. Ahram and C. Falcão, eds., Springer, 24 Jun 17, pp. 63-73. ⁴

DRYLIE, SCOTT T., Maj,

Assistant Professor of Cost Analysis, Department of Systems Engineering and Management, AFIT Appointment Date: 2018 (AFIT/ENV); BS, Economics, Montana State University, 1992; MS, Cost Analysis, Air Force Institute of Technology, 2012; PhD, Economics, George Mason University, 2016. Maj Drylie's research interests include Major Program Cost Estimating, Economics of Institutions, Economic History, and Risk modeling.
 Tel: 937-255-3636 x4441, email: Scott.Drylie@afit.edu

ELSHAW, JOHN J.,

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management, AFIT Appointment Date: 2013 (AFIT/ENV); BS, Accounting, University of Akron, 1991; MBA, Regis University, 1996, PhD, Krannert School of Management, Purdue University, 2010. Dr. Elshaw's research interests include organizational behavior, trust, leadership, human resource management, organizational causes of high-consequence errors, technology impact on individual and group behavior, social network analysis, cognition and emotions, organizational climate and culture, psychological influences on foreign audiences, cross-cultural leadership and communication, and hierarchical linear modeling. Tel. 937-255-3636 x4650, email: John.Elshaw@afit.edu

REFEREED JOURNAL PUBLICATIONS

Elshaw, John J., Badiru, Adedeji B., & Harris, Sharif F. (2017). Learning curve analysis in department of defense acquisition programs. Acquisition Research Program: Creating Synergy for Informed Change (online publication), 22 November 2017, Naval Postgraduate School.

Elshaw, Fass & Mauntel (2018). Cognitive mentorship: Protégé behavior as a mediator to performance, Mentoring & Tutoring: Partnership in Learning, DOI: 10.1080/13611267.2018.1511951.

Kim, Sungbin, Miller, Michael E., Rusnock, Christina F., & Elshaw, John J. (2018). Spatialized audio improves call sign recognition during multi-aircraft control. *Applied Ergonomics*, 70, pp. 51-58.

Guinn, V. L., Langhals, B. T., Elshaw, J. J. (2018). Evaluating Smartphones for Infrastructure Work Order Management, *International Journal of Interactive Mobile Technologies*, Vol 12, Issue 8, 2018

⁴ Not previously reported

Honious, C., Johnson, B., Elshaw, J., & Badiru, A. (2016). The impact of learning curve model selection and criteria for cost estimation accuracy in the DOD. Acquisition Research Program: Creating Synergy for Informed Change (online publication), 5 May 2016, Naval Postgraduate School.⁵

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Maestas, B., Elshaw, J., Hoisington, A., & Ohlemacher, D. (2018). Defining Success in Air Force Infrastructure Asset Management through Use of the Delphi Technique. The 13th World Congress on Engineering Asset Management, Stavanger Norway.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Boone, Evan R., Elshaw, John J., & Koschnick, Clay M. (2018). An Analysis of Learning Curve Theory and the Flattening Effect at the End of the Production Cycle. International Cost Estimation & Analysis Association (ICEAA) Dayton Chapter, AFIT Thesis Presentations: 02 March 2018.

Cotton, Tarah E., Fass, R. David, Elshaw, John J., Lucas, Brandon M. (2018). Decision Support Panel Discussion. International Cost Estimation & Analysis Association (ICEAA) Dayton Chapter, AFIT Thesis Presentations: 02 March 2018.

ENINGER, ROBERT M., Lt Col,

Assistant Professor of Industrial Hygiene, AFIT Appointment Date: 2015 (AFIT/ENV); BS, Civil and Environmental Engineering, United States Air Force Academy, 1995; MS, Civil Engineering, University of Texas-San Antonio, 2000; MS, Health Science, Purdue University, 2002; PhD, Environmental Health, University of Cincinnati, 2008. Lt Col Eninger's research interests include aerosol science, exposure assessment, and respiratory protective devices. Tel. 937-255-3636 x4511, email: Robert.Eninger@afit.edu

BOOKS AND CHAPTERS IN BOOKS

Racz, LeeAnn, Dirk P. Yamamoto, and Robert M. Eninger, eds. Handbook of Respiratory Protection: Safeguarding Against Current and Emerging Hazards. CRC Press, 2017.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Sanders, K., Slagley, J., Magnuson, M., Kaminski, M., & Eninger, R. *Radiological Decontamination in the Urban Environment Utilizing an Irreversible Wash-Aid Recovery System*. Poster presentation at AIHCE, Philadelphia, PA, 21-23 May 2018.

Trawick, J., Slagley, J., Hoisington, A., Eninger, R., McKenna, E., & Williams, D. *In-ear Dosimetry for Behavior Modification in Impulse and Continuous Noise Environments*. Podium presentation at DOD/VA Collaborative Auditory and Vestibular Research Network annual meeting, Wright-Patterson AFB, OH, 24-26 Apr 2018.

FASS, ROBERT D.,

Assistant Professor of Systems Integration and Cost Analysis, Department of Systems Engineering and Management, AFIT Appointment Date: 2015 (AFIT/ENV); BA Economics, University of New Mexico, 1989; MBA, University of New Mexico, 1993, PhD, Business Administration and Management, New Mexico State University, 2008. Dr. Fass's research interests include cost analysis, decision analysis, risk analysis, operations research, behavioral economics, organizational behavior, organizational change, and government acquisition policy. Tel. 937-255-3636 x4388, email: Robert.Fass@afit.edu

REFEREED JOURNAL PUBLICATIONS

Elshaw, J. J., Fass, R. D., Mauntel, B. R. (2018). Cognitive Mentorship: Protégé Behavior as a Mediator to Performance. Mentoring & Tutoring: Partnership in Learning. <https://doi.org/10.1080/13611267.2018.1530088>

⁵ Not previously reported.

Griffith, J. R., White, E. D., Fass, R. D., & Lucas, B. M. (2018). Comparison of Body Composition Metrics for United States Air Force Airmen. *Military medicine*, 183(3-4), e201-e207.

McGowin, A. L., Ritschel, J. D., Fass, R. D., & Boehmke, B. C. (2018). A text mining analysis of acquisition reforms and expert views. *Defense Acquisition Research Journal*, 25(3), 288–323. <https://doi.org/10.22594/dau.18-802.25.03>

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Cotton, Tarah E., Fass, R. David, Elshaw, John J., Lucas, Brandon M. (2018). Decision Support Panel Discussion. International Cost Estimation & Analysis Association (ICEAA) Dayton Chapter, AFIT Thesis Presentations: 02 March 2018.

FELKER, DANIEL L.,

Chemist GS-11, Department of Systems Engineering and Management, Appointment Date: 2006 (AFIT/ENV); PhD, Analytical Chemistry, Kansas State University, 2005; served in the United States Army from Dec 1986 to Aug 1997. Dr. Felker's current research interests include X-ray photoelectron spectroscopy of thin film surfaces with a focus on the surface absorption organophosphates; modeling the absorbent properties of nano-particles for remediation of toxic compounds; the mechanism of thermo deactivation of Bacillus Anthracis Spores; electrochemical biosensors for the detection of organophosphates; and environmental chemistry of wetlands. Tel. 937-255-3636 x7410, email: Daniel.Felker@afit.edu

FORD, THOMAS C.

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management, AFIT Appointment Date: 2014 (AFIT/ENV); BA, Chinese, Brigham Young University, 1994; BS, Electrical Engineering, Brigham Young University, 1994; MS, Engineering, Wright State University, 1998; PhD, Systems Engineering, Air Force Institute of Technology, 2008. Dr. Ford's research interests include model-based systems engineering, interoperability, system design, modeling & simulation, and resiliency. Tel. 937-255-3636 x4369, email: thomas.ford@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Daniel Cipera, David R. Jacques, and Thomas C. Ford. "Using MBSE in Satellite Architecture Trade Studies-A Practical Example," Proceedings of the 2018 Conference on Systems Engineering Research. Charlottesville, Virginia, 8-9 May 2018.

FREELS, JASON K., Maj,

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management, AFIT Appointment Date: 2013 (AFIT/ENV); BS, Auburn University, 2000; MS, Air Force Institute of Technology, 2006; PhD, Systems Engineering, Air Force Institute of Technology, 2013. Maj Freels' research interests include reliability growth testing, accelerated life testing, accelerated degradation testing, and competing risk analysis. Tel. 937-255-3636 x4676, email: Jason.Freels@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

J. K. Freels, D. A. Timme, J. J. Pignatiello, R. L. Warr, and R. R. Hill (2017), "*Maximum Likelihood Estimation for the Poly Weibull Distribution*," United States Air Force Operations Research Symposium – Dayton, OH.

J. K. Freels, D. A. Timme, J. J. Pignatiello, R. L. Warr, and R. R. Hill (2017), "*Maximum Likelihood Estimation for the Poly Weibull Distribution*," Military Operations Research Symposium – Annapolis, MD.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Freels J. K. and Boehmke B. R. (2018), teachingApps: An Implementation of Crawford's and Wright's Learning Curve Production Functions, Comprehensive R Archive Network; Package version 1.0.4.

GAY, CHRISTOPHER, A., Lt Col,

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management, AFIT Appointment Date: 2016 (AFIT/ENV); BS, Chemistry, Delta State University, 1995; MBA, Defense Acquisitions, Naval Post-Graduate School, 2006; PhD, Systems Engineering, University of Virginia, 2017. Lt Col Gay's research interests include systems thinking, systems management, acquisition management, and the application of trust/suspicion theory to human-machine team performance. Tel. 937-255-3636 x4568, email: Christopher.Gay@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Gay, C., Horowitz, B., Elshaw, J., Bobko, P., & Kim, I. (2017). Operator suspicion and decision responses to cyber-attacks on unmanned ground vehicle systems. Proceedings of the Human Factors and Ergonomics Society, 2017–October, 226–230.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Gay, C. A. (2017). Operator Suspicion and Detection / Response to Cyber-Attacks on Unmanned Systems. Doctoral Thesis under Dr. Barry Horowitz and Dr. Inki Kim.

Gay, C., Horowitz, B., Lau, N., Leach, K., Dinsmore, M., Jella, C., Rush, J. (2015). RT-115 Project Report-Part 2, Human Factors Engineering and System-Aware Cybersecurity.

GRMAILA, MICHAEL R.,

Professor and Head, Department of Systems Engineering and Management, AFIT Appointment Date: 2004 (AFIT/ENV); BS, Texas A&M University, 1993; MS, Texas A&M University, 1995; PhD, Computer Engineering, Texas A&M University, 1999. Dr. Grimaila's research interests include modeling and simulation, mission assurance, network management and security, quantum cryptography, and systems engineering. He is a member of the ACM, a Senior Member of the IEEE, a Fellow of the ISSA, and serves as an advisor to the Prince of Wales Fellows/Prince Edward Fellows at MIT and Harvard. AFIT research center affiliation(s): CCR and CSRA. Tel. 937-255-3636 x4800, email: Michael.Grimaila@afit.edu

REFEREED JOURNAL PUBLICATIONS

Engle, R., Langhals, B. T., Grimaila, M. R., Hodson, D. (2018). Evaluation Criteria for Selecting NoSQL Databases in a Single-Box Environment. International Journal of Database Management Systems, Vol. 10, No. 4, August 2018.

Mailloux, L.O. and Grimaila, M.R., "Advancing Cybersecurity: The Growing Need for a Cyber-Resiliency Workforce," IT Professional, 2018, 20(3), 23-30.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Engle, D.L., Langhals, B.T., Grimaila, M.R., Hodson, D.D., "The Case for NoSQL on a Single Desktop," 17th International Conference on Information & Knowledge Engineering, 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Engle, R., Langhals, B. T., Grimaila, M.R., Hodson, D., "Facilitating UAS Log Data Analysis Using Open Source Tools." Proceedings of the 43rd Dayton-Cincinnati Aerospace Sciences Symposium, Dayton, OH, 27 February 2018.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editor, Special Issue on Quantum Communication Systems, Journal of Defense Modeling and Simulation: Applications, Methodology, Technology, 2017.

Assistant Editor, The Defense Cyber Review, Army Cyber Institute, West Point, 2018.

HARPER, WILLIE F.,

Professor of Engineering and Environmental Management, Department of Systems Engineering and Management, AFIT Appointment Date: 2012 (AFIT/ENV); BS, Civil Engineering, University of California, Los Angeles, 1992; MS, Civil and Environmental Engineering, Cornell University, 1993; PhD, Civil and Environmental Engineering, University of California, Berkeley, 2002. Dr. Harper's research interests include water quality, with a focus on environmental biotechnology, advanced oxidation, and sensing. Tel. 937-255-3636 x4528, email: Willie.Harper@afit.edu

REFEREED JOURNAL PUBLICATIONS

Willie F. Harper, Jr., William Flemings, Kandace Bailey, Walter Lee, Daniel Felker, Vicente Gallardo, Matthew Magnuson, and Rebecca Phillips (2017). Adsorption of malathion onto copper and iron surfaces relevant to water infrastructure. *Journal of American Water Works Association*, Vol. 109(11), pp. E494-E502.

Brandon M. Stewart, Michael E. Miller, David M. Kempisty, John Stubbs, and Willie F. Harper, Jr. (2018). Oxidation of Tartrazine with ultraviolet light emitting diodes: pH and duty cycles effects. *Water Science and Technology*, Vol. 77 (3), 1651-1659.

Mbonimpa, E., Blatchley, E., Applegate, B., and Harper, W. (2018). Ultraviolet A and B wavelength-dependent inactivation of viruses and bacteria in the water. *Journal of Water and Health*, Vol. 16 (5), 796-806.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Phillips, R., Harper, W., Kempisty, D., and Magnuson, M. (2017). Water Contamination Incident Response & Recovery Research at EPA's National Homeland Security Research Center, 90th Annual Water Environment Federation Technical Exposition and Conference, Chicago, Ill., October 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Matthew Smith, Yun Xing, Kandace Bailey, Sean Stuntz, Joseph Kunicki, Jeff Szabo, Matthew Magnuson, Rebecca Phillips, Willie F. Harper, Jr. Activated sludge interactions with viral and spore-forming biocontaminants, U.S. Environmental Protection Agency International Decontamination Research and Development Conference, May 2018.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Willie F. Harper, Jr. Traitement des eaux (Water Treatment), The American Corner, University of Lome, Lome, Togo, April 2018.

Willie F. Harper, Jr. Le contrôle de la qualité des eaux de consommation (Quality Control for Drinking Water). Salon International de l'Eau, de l'énergie, et al l'environnement (International Exposition of Water, Energy, and the Environment), Togolese Center for Expositions and Fairs of Lome (CETEF), Lome, Togo, April 2018.

Willie F. Harper, Jr. Quelle politique de l'eau pour une meilleure production agricole (Water Policy for Improved Agricultural Production). Salon International de l'Eau, de l'énergie, et al l'environnement (International Exposition of Water, Energy, and the Environment), Togolese Center for Expositions and Fairs of Lome (CETEF), Lome, Togo, April 2018.

Willie F. Harper, Jr. Traitement et gestion des eaux usées (Treatment and Management of Wastewater). Salon International de l'Eau, de l'énergie, et al l'environnement (International Exposition of Water, Energy, and the Environment), Togolese Center for Expositions and Fairs of Lome (CETEF), Lome, Togo, April 2018.

HOISINGTON, ANDREW J., Lt Col,

Assistant Professor and Program Chair of Engineering Management, Department of Systems Engineering and Management, AFIT Appointment Date: 2017 (AFIT/ENV); BS, Civil Engineering, University of Michigan Ann Arbor 2001; MS, Environmental Engineering, University of Texas, Austin, 2007; PhD, Environmental Engineering,

University of Texas, Austin 2013. Lt Col Hoisington's research interests include air quality in the built environment, microbiome of the built environment, and air quality or microbiome factors that influence mental health. Tel. 937-255-3636 x4826, email: Andrew.Hoisington@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Detection and Quantification of Immunomodulatory Bacterial Species Important to Health and Performance."

Sponsor: 711 HPW. Funding: \$26,269.

"Longitudinal Assessment of the Influence of Lifestyle Homogenization on the MoBE in a Cohort of United States Air Force Cadets." Sponsor: Alfred P Sloan (UC Boulder). Funding: \$95,035.

REFEREED JOURNAL PUBLICATIONS

Hemmings SM, Malan-Muller S, van den Huevel LL, Demmitt BA, Smith DG, Bohr AD, Stamper CE, Hyde ER, Morton JT, Marotz CA, Siebler PH, Hoisington AJ, Brenner LA, Postolache TT, Dicks LM, McQueen MB, Krauter, KS, Knight R, Seedat S, Lowry CA. (2017). "The microbiome in Posttraumatic Stress Disorder (PTSD) and Trauma-Exposed Controls: An Exploratory Study," *Psychosom Med*, 79(8), 936-946.

Hoisington, A. J., Billera, D. M., Bates, K. L., Stamper, C. E., Stearns-Yoder, K. A., Lowry, C. A., & Brenner, L. A. (2018). Exploring service dogs for rehabilitation of veterans with PTSD: A microbiome perspective. *Rehabilitation Psychology*, 63(4), 575-587.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Hoisington A (2018). "Recognizing confounding factors for human microbiome toxicology studies," Invited presentation at Toxicology and Risk Assessment Conference 2018, 25 Apr 2018.

Trawick J, Slagley J, Hoisington A, Eninger R, McKenna E, Williams D. "In-ear Dosimetry for Behavior Modification in Impulse and Continuous Noise Environments," Podium presentation at DOD/VA Collaborative Auditory and Vestibular Research Network annual meeting, Wright-Patterson AFB, OH, 24-26 Apr 2018.

Wadhawan A, Daue M, Brenner L, Lowry C, Dagdag A, Stiller J, Benros M, Erlangsen A, Baca-Garcia E, Hoisington A, Snitker S, Pollin T, Constantine N, Fuchs D, Groer M, Hill D, Mitchell B, Postolache T (2018). "Toxoplasma oocyst IgG seropositivity and depression in the Old Order Amish," Poster Presentation at Society of Biological Psychiatry's 2018 Annual Meeting, 10 May 2018.

Hoisington A, Stamper C, Bates K, Lowry C. (2018). "Spatial and Longitudinal Influences on Accurately Predicting a Microbiome Biofingerprint." Poster Presentation at 2018 American Society of Microbiology Microbe's Conference, 9 Jun 2018.

Brenner L, Hoisington A, Stearns-Yoder K, Hoffmire C, Heinz J, Stamper C, Postolache T, Lowry C. (2018). "Characterization of Skin, Oral, and Gut Microbiome among a Cohort of US Military Veterans," Poster Presentation at 2018 American Society of Microbiology Microbe's Conference, 9 Jun 2018.

Brenner L, Stearns-Yoder K, Hoisington A, Postolache T, Gilbert J, Lowry C. (2018). "Biological Signature of an Immunomodulatory Probiotic Intervention for Veterans with Mild TBI and PTSD," Presented at Federal Interagency Conference on TBI, 11 Jun 2018.

JACQUES, DAVID R.,

Professor of Systems Engineering, Department of Systems Engineering and Management, AFIT Appointment Date: 1999 (AFIT/ENY); BS, Mechanical Engineering, Lehigh University, 1983; MS, Aeronautical Engineering, AFIT, 1989; PhD, Aeronautical Engineering, AFIT, 1995. Dr. Jacques' research interests include development planning, architecture based evaluation, multi-objective or constrained optimal design, and cooperative behavior and control of

autonomous vehicles. AFIT research center affiliation(s): ANT and CSRA. Tel. 937-255-3636 x3329, email: David.Jacques@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“System Qualities Ontology, Tradespace and Affordability (SQOTA) Project – Phase VII.” Sponsor: OSD. Funding: \$20,480.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Cipera, D., D. Jacques and T. Ford, “Comparison of Traditional Versus Cubesat Remote Sensing: A Model-Based System Engineering Approach,” *Conference on Systems Engineering Research*, Charlottesville, VA, May 2018.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Jacques, D. and R. Madachy, “Model Based Systems Engineering Tradespace Analysis with SysML and COSYSMO,” *Presented at the 9th Annual SERC Sponsor Research Review*, Washington D.C., November, 2017.

KOSCHNICK, CLAY M., Lt Col,

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management, AFIT Appointment Date: 2015 (AFIT/ENV); BS, United States Air Force Academy, 1998; MS, Georgia Institute of Technology, 2007; PhD, University of Florida, 2012. Lt Col Koschnick’s research interests include engineering economy, dynamic programming, and econometrics. Tel 937-255-3636 x4638, email: Clay.Koschnick@afit.edu

REFEREED JOURNAL PUBLICATIONS

Trudelle, Ryan C., White, Edward D., Koschnick, Clay M., Ritschel, Jonathan, D.Lucas, Brandon M. “Estimating an Acquisition Program’s Likelihood of Staying within Cost and Schedule Bounds.” *Defense Acquisition Review Journal*, October 2017, Vol. 24, No. 4, pp. 600-625.

LANGHALS, BRENT T.,

Assistant Professor of Information Resource Management, Department of Systems Engineering and Management, AFIT Appointment Date: 2016 (AFIT/ENV); BS, United States Air Force Academy, 1995; MS, Air Force Institute of Technology, 2001; PhD, University of Arizona, 2011. Dr. Langhals’ research interests include Data Analytics, “Big Data,” Human-Computer Interfaces, Systems Engineering, Vigilance, and Psychophysiological Cue Detection. Tel 937-255-3636 x7402, email: Brent.Langhals@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Modernizing Database Architectures in Support of Dynamic Data Driven Application Systems.” Sponsor: AFOSR. Funding: \$57,367 – Langhals 40%, Hodson 40%, Grimaila 20%.

REFEREED JOURNAL PUBLICATION

Engle, R., Langhals, B. T., Grimaila, M. R., Hodson, D. (2018). Evaluation Criteria for Selecting NoSQL Databases in a Single-Box Environment. *International Journal of Database Management Systems*, Vol. 10, No. 4, August 2018.

Guinn, V. L., Langhals, B. T., Elshaw, J. J. (2018). Evaluating Smartphones for Infrastructure Work Order Management, *International Journal of Interactive Mobile Technologies*, Vol 12, Issue 8, December 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Engle, R., Langhals, B. T., Grimaila, M. R., Hodsen, D., (2018) “The Case for NoSQL on a Single Desktop.” *Proceedings of the 17th International Conference on Information and Knowledge Engineering*, Las Vegas, NV.

Beach, P. M., Mills, R. F., Burfeind, B. C., Langhals, B.T., Mailloux, L.O., (2018) “A STAMP-Based Approach to Developing Quantifiable Measures of Resilience.” Proceedings of the 16th International Conference on Embedded Systems, Cyber-physical, Las Vegas, NV.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Engle, R., Langhals, B. T., Grimaila, M. R., Hodsen, D., “Facilitating UAS Log Data Analysis Using Open Source Tools.” Proceedings of the 43rd Dayton-Cincinnati Aerospace Sciences Symposium, Dayton, OH, 27 February 2018.

LONG, DAVID S.,

Assistant Professor of Systems Engineering (through Integrity Applications), Department of Systems Engineering and Management, AFIT Appointment Date: 2016 (AFIT/ENV); BS, Industrial Engineering & Management, North Dakota State University, 1988; MS, Engineering, California State University Northridge; PhD, Engineering Systems, Massachusetts Institute of Technology, 2012. Dr. Long research interests include systems of systems, open systems architecture, model based systems engineering, wicked problems, human machine interfaces, automation and autonomy. Tel. 937-255-3636 x4390, email: David.Long.ctr@afit.edu

LUCAS, BRANDON M., Lt Col,

Assistant Professor of Cost Analysis, Department of Systems Engineering and Management, AFIT Appointment Date: 2015 (AFIT/ENV); BA, University of Texas at Austin, 1998; ME & MA, University of Oklahoma, 2002; MS, Air Force Institute of Technology, 2004; PhD, Economics, George Mason University, 2011. Lt Col Lucas’ research interests include incentive structures, profit motives, coordination issues, and the economics of public choice & the law. Tel. 937-255-3636 x4441, email: Brandon.Lucas@afit.edu

REFEREED JOURNAL PUBLICATIONS

Ryan Trudelle, Edward D., Dan Ritschel , Clay Koschnick , and Brandon Lucas. *Modeling median will-cost estimates for defense acquisition programs*. Journal of Defense Analytics and Logistics, Vol. 1 Issue 1, 2018.

J R Griffith, Edward D White., R David Fass, and Brandon M Lucas. *Comparison of Body Composition Metrics for United States Air Force Airmen*. Military Medicine, Vol. 183, Issue 3-4, pp. e201–207, March 2018.

Ryan Trudelle, Edward D. White, Clay Koschnick, Jonathon D. Ritschel, and Brandon Lucas. *Likelihood of Staying within Cost and Schedule Bounds*. Defense Acquisition Research Journal, 24(40), 600-625, 2017.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Boone, Evan., Elshaw, John J., Lucas, Brandon M., Koschnick, Clay, and Valentine, Shawn (2018). Learning Curve Theory and the Flattening Effect. International Cost Estimation & Analysis Association (ICEAA) Dayton Chapter, AFIT Thesis Presentations: 02 March 2018.

Cotton, Tarah E., Fass, R. David, Elshaw, John J., Lucas, Brandon M. (2018). Decision Support Panel Discussion. International Cost Estimation & Analysis Association (ICEAA) Dayton Chapter, AFIT Thesis Presentations: 02 March 2018.

Ellis, James., White, Edward, Lucas, Brandon, Ritschel, Jonathan, and Valentine, Shawn. (2018). Contracts Panel Discussion – Impact of Changing Requirements. International Cost Estimation & Analysis Association (ICEAA) Dayton Chapter, AFIT Thesis Presentations: 02 March 2018

James Ellis, Edward D. White, Dan Ritschel, Shawn Valentine, and Brandon Lucas. *Likelihood and Cost Impact of Engineering Change Requirements for DOD Contracts*. Journal of Defense Analytics and Logistics.

MAILLOUX, LOGAN O., Maj,

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management, AFIT Appointment Date: 2015 (AFIT/ENV); BS, Computer Engineering, Lawrence Technological University, 2002; MS,

Systems Engineering, Air Force Institute of Technology, 2008; PhD, Systems Engineering, Air Force Institute of Technology, 2015. He is commissioned as Major in the United States Air Force (USAF) and serves as a computer developmental engineer. Maj Mailloux is a Certified Information System Security Professional (CISSP), Certified Systems Engineering Professional (CSEP), and holds department of defense certifications in cyberspace operations, systems engineering science and technology management, test & evaluation, and program management. He is a member of IEEE, ACM, INCOSE, and ITEA professional societies, as well as, HKN and TBP honor societies. Maj Mailloux has served the USAF as a cyberspace operations expert responsible for planning and executing network defense exercises, documenting and training computer security best practices, performing test and evaluation of enterprise resource planning solutions, and maintaining distributed simulation infrastructure. Maj Mailloux's research interests include system security engineering, complex information systems, and quantum key distribution. AFIT research center affiliation(s): CCR and CSRA. Tel. 937-255-3636 x3348, email: Logan.Mailloux@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Model and Analyze Space Systems Security Design, Architecture, and Resiliency Criteria.” Sponsor: AFRL/RV.
Funding: \$62,500. [CSRA]

REFEREED JOURNAL PUBLICATIONS

Mailloux, L. O., & Grimaila, M. (2018). Advancing Cybersecurity: The Growing Need for a Cyber-Resiliency Workforce. *IT Professional*, 20(3), 23-30.

Simon, G. K., Huff, B. K., Meier, W. M., Mailloux, L. O., & Harrell, L. E. (2018). Quantification of the Impact of Photon_Distinguishability on Measurement-Device-Independent Quantum Key Distribution. *Electronics*, 7(4), 49.

Badenhop, C. W., Graham, S. R., Ramsey, B. W., Mullins, B. E., & Mailloux, L. O. (2017). The Z-Wave routing protocol and its security implications. *Computers & Security*, 68, 112-129.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Span, M. X., Mailloux, L. O., Young, W. E., (2018). A Systems Security Analysis Approach for Understanding, Defining, and Specifying Security Requirements for Complex Cyber-Physical Systems. In *Proceedings of the 2018 Cyber Security*. Glasgow, Scotland. June 10-11.

Mailloux, L. O., Beach, P. M., & Span, M. T. (2018). Examination of security design principles from NIST SP 800-160. In *Systems Conference (SysCon), 2018 Annual IEEE International*. IEEE.

Willis, J. M., Mills, R. F., Mailloux, L. O., & Graham, S. R. (2018). MIL-STD-1553 Device Characterization using Organic Interface Functionality. *SCI-300 Specialists' Meeting on 'Cyber Physical Security of Defense Systems'*. Fort Walton Beach, FL. May 8-9.

Connors, J., Graham, S. R., & Mailloux, L. O. (2018). Cyber Synthetic Modeling for Vehicle-to-Vehicle Applications. In *International Conference on Cyber Warfare and Security*, Washington, DC. March 8-9.

Willis, J. M., Mills, R. F., Mailloux, L. O., & Graham, S. R. (2017). Considerations for secure and resilient satellite architectures. In *Cyber Conflict (CyCon US), 2017 International Conference on*. Washington, DC. November 7-8.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Beach, P. M., Mills, R. F., Burfeind, B. C., & Mailloux, L. O. (2018). A STAMP-Based Approach to Developing Quantifiable Measures of Resilience. In *Proceedings of the 2018 International Conference on Foundations of Computer Science*, Las Vegas, NV, July 26-29.

Span, M., Mailloux, L. O., Mills, R. F., & Young, W. E. (2018). Conceptual Systems Security_Requirements Analysis: Aerial Refueling Case Study. *IEEE Access*.

Mailloux, L. O. (2018). Bringing Systems and Security Engineering Together. In *International Systems Engineering Conference*. Rome, Italy. October 1-3.

MBONIMPA, ERIC G.,

Assistant Professor of Engineering and Environmental Management, Department of Systems Engineering and Management, AFIT Appointment Date: 2014 (AFIT/ENV); BS, Civil Engineering, Kigali Institute of Science and Technology, 2004; MS, Environmental Engineering, University of Missouri-Columbia, 2007; PhD, Environmental Engineering, Purdue University, 2010. Dr. Mbonimpa's research interests include environmental sustainability, life cycle assessment, and water quality. Tel. 937-255-3636 x7405, email: Eric.Mbonimpa@afit.edu

REFEREED JOURNAL PUBLICATIONS

Gautam S., E. Mbonimpa, S. Kumar, J. Bonta. Simulating Runoff from Small Grazed Pasture Watersheds located at North Appalachian Experimental Watershed in Ohio. *Rangeland Ecology & Management* 71(3):363-369. 2018. <https://doi.org/10.1016/j.rama.2017.12.008>

Emery I., D. Kempisty, B. Fain, E. Mbonimpa. Evaluation of treatment options for potable water impacted with perfluorinated alkyl substances using life cycle assessment. *International Journal of Life Cycle Assessment* <https://doi.org/10.1007/s11367-018-1499-8>

Mbonimpa, E., Blatchley, E., Applegate, B., and Harper, W. (2018). Ultraviolet A and B wavelength-dependent inactivation of viruses and bacteria in the water. *Journal of Water and Health*, Vol. 16 (5), 796-806.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Glass J and E. Mbonimpa. Toxicity Impact Assessment of PFOS and PFOA -Innovation in Water Resource Management, WMAO conference, Cincinnati, Ohio, 2018.

Jordan R and E. Mbonimpa. "PFOS Fate and Transport Modeling Using Numeric and Analytic Models- Innovation in Water Resource Management," WMAO conference, Cincinnati, Ohio, 2018.

Swift, C.A., Mbonimpa, E.G., Eninger, R.M., Grabinski, C.M. (2017). M1A1 Abrams Main Battle Tank Crew Member Occupational Inhalation Health Hazard Risk Analysis During Live-Fire of the 120mm, 7.62 mm, and .50 caliber Weapon Systems, Abstracts of the American Industrial Hygiene Conference and Exposition (Seattle, Washington, U.S.A., 2017), poster session.

MILLER, MICHAEL E.,

Associate Professor of Systems Integration, Department of Systems Engineering and Management, AFIT Appointment Date: 2010 (AFIT/ENV); BS, Ohio University, 1987; MS, Ohio University, 1989; PhD, Industrial and Systems Engineering, Virginia Tech., 1993. Dr. Miller's research interests include Human Systems Integration, Human-Automated Agent Interaction, and Application of Human Vision to Display, and Lighting Design. AFIT research center affiliation(s): ANT. Tel. 937-255-3636 x4651, email: Michael.Miller@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Enhanced HMD-Capable Gaze Tracker Using Steady-State Visually-Evoked Potentials." Sponsor: 711 HPW. Funding: \$9,041 – Miller 50%, Borghetti 50%. [ANT]

"Computational Agent Capable of Adapting Roles within a Human-Machine Team." Sponsor: AFOSR. Funding: \$174,825 – Miller 30%, Bindewald 30%, Peterson 30%, Langhals 10%. [ANT]

"Test and Evaluation of Autonomous Systems." Sponsor: OFRN (WSU). Funding: \$30,000 – Miller 60%, Jacques 40%. [ANT]

REFEREED JOURNAL PUBLICATIONS

Goodman, T.J., Miller, M.E., Rusnock, C.F. and Bindewald, J.M. (2017). Effects of Agent Timing on the Human-Agent Team, *Cognitive Systems Research* 46, 40-51. <https://doi.org/10.1016/j.cogsys.2017.02.007>.

Stewart, B.M., Stubbs, J.E., Kempisty, D.M., Miller, M.E., and Harper, Jr, W.F (2018). Oxidation of Tartrazine with Ultraviolet Light Emitting Diodes: pH and Duty Cycle Effects, *Water Science and Technology* 77(6), 1651-1659.

Kim, S., Miller, M.E., Rusnock, C.F., and Elshaw, J. (2018). Spatial Audio Improves Call Sign Recognition during Multi-Aircraft Control, *Applied Ergonomics* 70, 51-58. <https://authors.elsevier.com/a/1WbDyrfpQeEM>

Satava II, S.J., Parr, J.C., and Miller, M.E. (2018). A Method for Developing Side Impact Upper Neck Injury Criteria which Compensates for Biomechanical Differences between ATDs and Humans, *IIEE Transactions on Occupational Ergonomics and Human Factors*, 6(2), 51-63. doi: 10.1080/24725838.2018.1482242.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Johnson, C.D., Miller, M.E., Rusnock, C.F. and Jacques, D.R. (2017). A Framework for Understanding Automation in Terms of Levels of Human Control Abstraction, 2017 IEEE International Conference on Systems, Man, and Cybernetics, Banff, CA.

Williams, J. Miller, M.E., Parr, J.C., (2018). Investigating Critical Values in Side Impact Neck Injury Criterion, Industrial and Systems Engineering Research Conference, Orlando, FL.

Schneider, M.F., Bragg, I.L., Henderson, J.P., and Miller, M.E. (2018). Human Engagement with Event Rate Driven Adaptation of Automated Agents, Industrial and Systems Engineering Research Conference, Orlando, FL.

Hillesheim, A., Rusnock, C., Miller, M.E., and Bindewald, J. (2018). Simulation of Human-Agent Team Performance in Reduced Reliability Environments, Industrial and Systems Engineering Research Conference, Orlando, FL.

Schneider, M. and Miller, M.E. (2018). Operationalized Intent for Communication in Human-Agent Teams, IEEE Conference on Cognitive and Computational Aspects of Situation Management, Boston, MA.

PATENTS AWARDED

Ninan, A., Wan, C.C, Kunkel, T. and Miller, M.E. (2017). Quantum dot/remote phosphor display system improvements, United States Patent 9,746,157.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Bindewald, J.M. Peterson, G.L., and Miller, M.E. (in revision). Creating Effective Automations that Maintain Explicit User Engagement, *IEEE Transactions on Human-Machine Systems*. [ANT]

Johnson, C., Miller, M.E., and Rusnock, C.F. (in revision). A Framework for Analyzing and Discussing Levels of Human Control Abstraction, *Journal of Cognitive Engineering and Decision Making*. [ANT]

MORAN, KENNETH O.,

Assistant Professor of Engineering and Environmental Management, Department of Systems Engineering and Management. AFIT Appointment Date: 2015 (AFIT/ENV); PhD, Aeronautical Engineering, AFIT, 1994. Research interests include systems engineering, unmanned systems, and/or space systems, early concept refinement, policy analytics, optimal designs, design trade space, modeling and simulation, and flight test. Tel. 937-255-3636 x4310, email: Kenneth.Moran@afit.edu

PARR, JEFFREY C., Lt Col,

Assistant Professor of Engineering and Environmental Management, Department of Systems Engineering and

Management. AFIT Appointment Date: 2014 (AFIT/ENV); BS, Civil Engineering, US Air Force Academy, 1998; MS, Environmental Engineering, AFIT 2002; PhD, Systems Engineering, AFIT, 2014. Research interests include human systems, injury criteria, and ejection system requirements. Tel. 937-255-3636 x4709, email: Jeffrey.Parr@afit.edu

REFEREED JOURNAL PUBLICATIONS

Satava, S.J., Parr, J.C., Miller, M.E. (to appear). A Method for Developing a Side Impact Upper Neck Injury Criteria which Compensates for Biomechanical Differences between ATDs and Humans. IISE Transactions on Occupational Ergonomics and Human Factors. ID: 1482242. DOI:10.1080/24725838.2018.1482242

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Parr, J.C., Satava, S.J. "Side Impact Neck Injury Criteria Development." Presented at the SAFE Association 55th Annual Symposium, 30 Oct – 1 Nov 2017, Orlando FL.

PRIGGE, DIEDRICH V.,

Assistant Professor of Engineering Management, Department of Systems Engineering and Management. AFIT Appointment Date: 2016 (AFIT/ENV); BS, Arizona State University, 2002; MS, Arizona State University, 2010; PhD, Arizona State University, 2013. Dr. Prigge's research interests include leadership, management, construction, volunteerism, productivity, and cross-cultural global integration. Tel. 937-255-3636 x4648, email: Diedrich.Prigge@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Evaluating the Use of High Molecular Weight Methacrylate (HMWM) as a Treatment for Shrinkage Cracking in Airfield Pavements." Sponsor: AFCEC. Funding: \$13,080.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

C. Edlund and D. Prigge, (2017 November). Monitoring Permafrost Degradation in Alaska, The Military Engineer, Volume 109, cover and pg 53.

C. Edlund, A. Graboski, D. Prigge, K. Bartlett, "Impacts of Climate Change and Anthropogenic Activity on Permafrost Soils at Eielson Air Force Base, Alaska," Journal of Cold Regions Engineering.

J. Breuker, D. Prigge, E. Dicks, G.E. Gibson, Jr. "Challenges of PDRI Implementation of Air Force Military Construction Projects," Journal of Management in Engineering.

J. Chambers-Mills, D. Prigge, "A Comparative Accreditation Alignment Analysis of Civil Engineering and Construction Management Bachelor Degrees with the Skill Requirements for USAF Civil Engineer Officers," International Journal of Construction Education and Research.

RITSCHER, JONATHAN D.,

Assistant Professor of Cost Analysis, Department of Systems Engineering and Management, AFIT Appointment Date: 2011 (AFIT/ENV); BBA, Accountancy, University of Notre Dame, 1997; MS, Cost Analysis, Air Force Institute of Technology, Wright-Patterson AFB, OH, 2003; PhD, Economics, George Mason University, VA, 2011. Dr. Ritschel's research interests include public choice, the effects of acquisition reforms on cost growth in DOD weapon systems, research and development cost estimation, and economic institutional analysis. Tel. 937-255-3636 x4484, email: Jonathan.Ritschel@afit.edu

REFEREED JOURNAL PUBLICATIONS

Bunecke, K., White, E.D., Ritschel, J.D., and Bush, B.A. (2018). "Evaluating Annual Fixed Wing Maintenance Costs," *Defense Acquisition Research Journal*, 25(3), 244-263. DOI: <https://doi.org/10.22594/dau.18-797.25.03>

- D'Amico, C.N., White, E.D., Ritschel, J.D., and Kozlak, S.J. (2018) "Unmasking Cost Growth Behavior: A Longitudinal Study," *Defense Acquisition Research Journal*, 25(1), 30-51.
- Douglas, M.A., and Ritschel, J.D. (2018). "Air advising in Afghanistan: Building an Organization in Flight," *Air and Space Power Journal*, 32(3) 85-91.
- Ellis, J., White, E.D., Ritschel, J.D., Valentine, S., Lucas, B.M., and Cordell, I. (2018). "Likelihood and Cost Impact of Engineering Change Requirements for DOD Contracts," *Journal of Defense Analytics and Logistics* 2 (1). 22-37. DOI: <https://doi.org/10.1108/JDAL-02-2018-0002>
- Gardner, N.R., Ritschel, J.D., White, E.D., and Wallen, A.T. (2017). "Forecasting Foreign Exchange Rates for Department of Defense Budgeting," *Journal of Public Procurement*, 17(3). 315-336.
- Hewitson, S., Ritschel, J.D., White, E.D. and Brown, G.E. (2018). "Analyzing Operating and Support Costs for Air Force Aircraft," *Journal of Defense Analytics and Logistics* 2(1) 38-54. DOI: <https://doi.org/10.1108/JDAL-02-2018-0002>
- McGowin, A.L., Ritschel, J.D., Fass, R.D. and Boehmke, B. (2018). "A Text Mining Analysis of Acquisition Reforms and Expert Views," *Defense Acquisition Research Journal*, 25(3). 288-323. DOI: <https://doi.org/10.22594/dau.18-802.25.03>
- O'Hanlon, G.B., Ritschel, J.D., White, E.D., and Brown, G.E. (2018). "Delineating Operating and Support Costs in Aircraft Platforms," *Defense Acquisition Research Journal*, 25(3) 264-287. DOI: <https://doi.org/10.22594/dau.18-801.25.03>
- Trudelle, R.C., White, E.D., Koschnick, C.M., Ritschel, J.D., and Lucas, B.M. (2017). "Estimating the Likelihood of a Defense Acquisition Program Staying within Cost and Schedule Bounds," *Defense Acquisition Research Journal*, 24 4, 600-625.

SCHULDT, STEVEN, J., Maj

Assistant Professor of Engineering Management, Department of Systems Engineering and Management, AFIT Appointment Date: 2018 (AFIT/ENV); BS, University of Illinois Urbana-Champaign, 2006; MS, Air Force Institute of Technology, 2012; PhD, University of Illinois Urbana-Champaign, 2017. Maj Schuldt's research interests include construction management, multi-objective optimization, installation resiliency and sustainability. Tel. 937-255-3636 x4645, email: Steven.Schuldt@afit.edu

REFEREED JOURNAL PUBLICATIONS

- Schuldt, S., and El-Rayes, K. (2018). "Optimizing the Planning of Remote Construction Sites to Minimize Facility Destruction from Explosive Attacks." *Journal of Construction Engineering and Management*, 144(5), 4018020.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

- Schuldt, S., and El-Rayes, K. (2018). "Optimal tradeoffs between the security and cost of critical buildings and infrastructure systems." *International Journal of Safety and Security Engineering*, 8(2), 299–306.

SITU, JOHN, X., Maj

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management, AFIT Appointment Date: 2018 (AFIT/ENV); BS, University of Texas at Austin, 2006; MS, Air Force Institute of Technology, 2012; PhD, George Mason University, 2018. Dr. Situ's research interests include stochastic optimization, meta-heuristics, approximate dynamic programming and decision analysis, specifically for military personnel and manpower management. Tel. 937-255-3636 x4709, email: John.situ@afit.edu

SLAGLEY, JEREMY M.,

Assistant Professor of Industrial Hygiene and Environmental Science, Department of Systems Engineering and Management, AFIT Appointment Date: 2016 (AFIT/ENV); BS, United States Military Academy, 1993; MS,

University of Iowa, 2000; PhD, West Virginia University, 2006. Dr. Slagley's research interests include occupational stressor assessment and control, specifically for hazardous noise, aerosols, and exposure assessment. He also models deployed waste-to-energy systems for sustainability. Tel. 937-255-3636 x4632, email: Jeremy.Slagley@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Study of Bio-Corrosion of Selected Model Materials using XPS and Other Selected Methods." Sponsor: AFRL/RX. Funding: \$20,000 – Slagley 90%, Felker 10%.

"Gap Analysis of Expeditionary Medical Support (EMEDS) and Air Force Theater Hospital (AFTH) Patient and Materiel Decontamination in CBRN Environments ." Sponsor: USAFSAM. Funding: \$160,000 – Slagley 50%, Eninger 50%.

REFEREED JOURNAL PUBLICATIONS

Bradshaw, John, Slagley, Jeremy, Iannacchione, Nicole, and Lees, Matthew. (2018). Measuring Leak Rates from Abandoned Natural Gas Wells in Western Pennsylvania. *Journal of Scientific and Industrial Metrology*, 2(1), 1-5. DOI: 10.21767/2472-1948.100014

Richburg, C., Slagley, J. (2018). Noise and Light Concerns of Residents Living in Close Proximity to Hydraulic Fracturing Sites in Southwestern Pennsylvania. *Public Health Nursing*.

Schaal, N., Slagley, J., Richburg, C., Zreiqat, M., & Paschold, H. (2018). Chemical induced hearing loss in shipyard workers. *Journal of Occupational and Environmental Medicine*, 60(1), e55-e62. JIF: 1.861

Slagley, J.M., Paschold, H., Engler, J. (2017). Evaluation of Coverall Field Dry Aerosol Decontamination Methods Using a Manikin. *Journal of Occupational and Environmental Hygiene*, 14(7), 502-509. DOI: 10.1080/15459624.2017.1296235. JIF: 1.155

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Trawick, J., Slagley, J., Murphy, W., Wells, A., McKenna, E., Williams, D., & Eninger, R. Occupational Noise Dose Reduction among Air Force Personnel Podium presentation at 11th International Occupational Hygiene Association, Washington, DC, 24-26 Sep 2018.

Slagley, J., & Paschold, H. Common Occupational and Environmental Health Exposures in Gas and Oil Extraction Podium presentation at ASSE, San Antonio, TX, 3-6 Jun 2018.

Kuhar, E., Minnick, W., Zreiqat, M., & Slagley, J. An Examination of Preferred Equipment, Assessment Tools and Content Topics for EHS Baccalaureate Curricula Poster presentation at ASSE, San Antonio, TX, 3-6 Jun 2018.

Sanders, K., Slagley, J., Magnuson, M., Kaminski, M., & Eninger, R. Radiological Decontamination in the Urban Environment Utilizing an Irreversible Wash-Aid Recovery System, Poster presentation at AIHCE, Philadelphia, PA, 21-23 May 2018.

Trawick, J., Slagley, J., Hoisington, A., Eninger, R., McKenna, E., & Williams, D. In-ear Dosimetry for Behavior Modification in Impulse and Continuous Noise Environments. Podium presentation at DOD/VA Collaborative Auditory and Vestibular Research Network annual meeting, Wright-Patterson AFB, OH, 24-26 Apr 2018.

STUBBS, JOHN E., Lt Col

Assistant Professor and Program Director of Environmental Engineering and Science, Department of Systems Engineering and Management, AFIT Appointment Date: 2017 (AFIT/ENV); BS, Industrial Engineering, North Carolina State University, 1998; MS, Industrial Hygiene, AFIT, 2010; PhD, Systems Engineering, AFIT, 2017. Lt Col Stubbs' research interests include physical water treatment processes, chemical water treatment processes, water treatment trains, and environmental sustainability. Tel. 937-255-3636 x4329, email: john.stubbs@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Water Treatment by Advanced Oxidation Treatment Train (IA DW-057-92441501).” Sponsor: EPA. Funding: \$50,000.

REFEREED JOURNAL PUBLICATIONS

Stewart, Brandon, Miller, Michael E., Kempisty, David, Stubbs, John, Harper, Willie. “Oxidation of Tartrazine with Ultraviolet Light Emitting Diodes: pH and Duty Cycle Effects.” *Water Science and Technology*, 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Dyson, Sean, Stubbs, John, Magnuson, Matthew, Mills, Marc. “Removal of Perfluorinated Compounds from Post-Emergency Wastewater by Advanced Oxidation Process and Granular Activated Carbon Adsorption.” 2018 International Decontamination Research and Development Conference, Research Triangle Park, NC, 8-10 May, 2018.

Phillips, Rebecca, Magnuson, Matthew, Szabo, Jeff, Hall, John, Mills, Marc, Xing, Yun, Dyson, Sean, Stubbs, John, Kempisty, David. “Being Your Own Worst Enemy: Treatment of Perfluorinated Firefighting Foams with Advanced Oxidation & Adsorption,” CBERNe Convergence Congress and Exhibition, Indianapolis, IN, 6-8 Nov 2017.

Magnuson, Matthew, Szabo, Jeff, Hall, John, Phillips, Rebecca, Harper, Willie, Stubbs, John. “The Science Behind the Scene: Overview of Research to Support CBRN Incident Response & Recovery at EPA National Homeland Security Research Center and US Air Force Institute of Technology,” CBERNe Convergence Congress and Exhibition, Indianapolis, IN, 6-8 Nov 2017.

Stubbs, John E. “The Use of Ultraviolet Light Emitting Diodes in a Net Zero Water Treatment System (podium presentation).” 46th Annual Water Management Association of Ohio (WMAO) Conference and Symposium, Columbus, OH, 27 Oct 2017.

THAL, ALFRED E., Jr.,

Associate Professor of Engineering Management, Department of Systems Engineering and Management, AFIT
Appointment Date: 1998 (AFIT/ENV); BS, Civil Engineering, Texas Tech University, 1981; MS, Engineering Management, AFIT, 1985; PhD, Environmental Engineering, University of Oklahoma, 1999. Dr. Thal’s research interests include engineering and environmental management, groundwater flow and remediation technologies, facility and infrastructure management, product development, sustainability, and project management.
Tel. 937-255-3636 x7401, email: Al.Thal@afit.edu

REFEREED JOURNAL PUBLICATIONS

Alley, S.L., V.V. Valencia, A.E. Thal, Jr., and E.D. White III, “Probabilistic Assessment of Failure for United States Air Force Building Systems,” *Journal of Performance of Constructed Facilities*, Vol. 31 No. 5, 04017088-1 to 04017088-10, [https://doi.org/10.1061/\(ASCE\)CF.1943-5509.0001077](https://doi.org/10.1061/(ASCE)CF.1943-5509.0001077), October 2017.

Clayson, D.S., A.E. Thal, Jr., and E.D. White III, “Cost Performance Index Stability in Environmental Remediation Projects,” *Journal of Defense Analytics and Logistics*, Vol.2, Issue 3, 94-109, <https://doi.org/10.1108/JDAL-11-2017-0024>, 2018.

BOOKS AND CHAPTERS IN BOOKS

Thal, A.E., Jr., and D.E. Shahady, “Is your organization ready for innovation?” in *Defense Innovation Handbook: Guidelines, Strategies, and Techniques*. Ed. A.B. Badiru and C. Barlow, CRC Press/Taylor and Francis (September 2018).

WAGNER, TORREY J., Lt Col,

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management, AFIT
Appointment Date: 2017 (AFIT/ENV); BS, Electrical Engineering, University of Minnesota, 2000; MS, Aerospace Systems Engineering, Loughborough University, 2004; PhD, Electro-optics, Air Force Institute of Technology, 2010.
Lt Col Wagner's primary interest is in renewable energy and water systems engineering, with research topics including solar energy, UV water treatment and small-grid energy systems. Tel. 937-255-3636 x4611,
email: Torrey.Wagner@afit.edu

REFEREED JOURNAL PUBLICATIONS

Torrey Wagner, Thomas Ford, "DOD Applications of Agile Software Systems Engineering Methods," *Journal of Defense Research & Engineering*, 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Torrey Wagner, Eric Lang, Warren Assink, Douglas Dudis, "Photovoltaic System Optimization for an Austere Location Using Time-Series Data," IEEE 45th Photovoltaic Specialists Conference, Kona, HI, June 2018.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

J. Poole, T. Wagner, D. Dudis, "8x Raven Small UAS Endurance with an Optimized Hybrid Solid Oxide Fuel Cell & Battery Energy System," *Journal of Defense Research & Engineering*.

D. Chester, T. Wagner, D. Dudis, "36% Reduction in Fuel Resupply Using a Hybrid Generator & Battery System for an Austere Location," *Marine Corps Gazette – The Professional Journal of the United States Marine Corps*.

6. RESEARCH CENTER PUBLICATIONS AND FUNDING INFORMATION

The contents of this section are duplicated data, grouped by center. The information is previously listed within each project's specific academic department.

6.1. AUTONOMY AND NAVIGATION TECHNOLOGY CENTER

Autonomy and Navigation Technology (ANT) Center

Director (937) 255-3636 x4755

Executive Administrator (937) 255-3636 x4583

Laboratory Manager (937) 255-3636 x4911

Homepage: <http://www.afit.edu/ANT>

6.1.1. DOCTORAL DISSERTATIONS

CURRO, JOSEPH A., Navigation with Artificial Neural Networks. AFIT/ENG/DS/18S-007. Faculty Advisor: Dr. John F. Raquet. Sponsor: N/A.

WEBBER, FREDERICK C., Multi-Objective Reinforcement Learning with Concept Drift. AFIT/ENG/DS/17D-006. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: 711 HPW/RH.

ZOLLARS, MICHAEL D., Simplex Control Methods for Robust Convergence of Small Unmanned Aircraft Flight Trajectories in the Constrained Urban Environment. AFIT/ENY/DS/18S-078. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RQ.

6.1.2. MASTER'S THESES

ALLEN, TIMOTHY J., Design and Test of a UAV Swarm Architecture over a Mesh Ad-hoc Network. AFIT/ENV/MS/18M-172. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A.

ALOMBRO, MATTHEW N., Small Arms Weapon Orientation and Position Estimation through Scenario-Based Simulations. AFIT/ENG/MS/18M-006. Faculty Advisor: Maj Scott J. Pierce. Sponsor: ARL HRED.

ANDERSON, ROGER S., Defender-Assisted Evasion and Pursuit Maneuvers. AFIT/ENG/MS/18M-007. Faculty Advisor: Dr. Meir Pachter. Sponsor: AFOSR.

BODIN, TAYLOR B., Behavior Flexibility for Autonomous Unmanned Aerial Systems. AFIT/ENG/MS/18M-011. Faculty Advisor: Maj Jason M. Bindewald. Sponsor: N/A.

BROYLES, DANIEL J., Non-GNSS Smartphone Pedestrian Navigation Using Barometric Elevation and Digital Map-Matching. AFIT/ENG/MS/18M-015. Faculty Advisor: Dr. John F. Raquet. Sponsor: AFRL/RI.

GOODBODY, IAN R., Applying Direct GPS Spectrum Sensing Anti-jamming Receiver Solutions. AFIT/ENG/MS/18M-029. Faculty Advisor: Dr. Sanjeev Gunawardena. Sponsor: 746 TS.

LEE, KIJUN., Military Application of Aerial Photogrammetry Mapping Assisted by Small Unmanned Air Vehicles. AFIT/ENV/MS/18M-219. Faculty Advisor: Dr. David R. Jacques. Sponsor: N/A.

MALEC, MICHAEL P., Airborne Magnetic Anomaly Navigation Over Ocean Using Under Sampled Maps. AFIT/ENG/MS/18M-044. Faculty Advisor: Capt Aaron J. Canciani. Sponsor: ONR.

MOUNT, LAUREN A., Navigation Using Vector and Tensor Measurements of the Earth's Magnetic Anomaly Field. AFIT/ENG/MS/18M-049. Faculty Advisor: Capt Aaron J. Canciani. Sponsor: ONR.

PAULSON, ZACHARY C., Mitigating the Effects of Boom Occlusion on Automated Aerial Refueling Through Shadow Volumes. AFIT/ENG/MS/18M-051. Faculty Advisor: Dr. Scott L. Nykl. Sponsor: AFRL/RQ.

PENTECOST, SEELEY M., Demonstration of Signal Authentication and Dynamic Configuration Concepts for Next-Generation GPS Satellites. AFIT/ENG/MS/18M-052. Faculty Advisor: Dr. Sanjeev Gunawardena. Sponsor: AFRL/RV.

PHAN, TIFFANY M., RSS-based Device-free Passive Detection and Localization Using Home Automation Network Radio Frequencies. AFIT/ENG/MS/18M-054. Faculty Advisor: Dr. Richard K. Martin. Sponsor: N/A.

ROEBER, JONATHAN B., Assessment of Structure from Motion for Reconnaissance Augmentation and Bandwidth Usage Reduction. AFIT/ENG/MS/18M-055. Faculty Advisor: Dr. Scott L. Nykl. Sponsor: N/A.

SEYDEL, NICHOLAS J., Stereo Vision: A Comparison of Synthetic Imagery vs Real World Imagery for the Automated Aerial Refueling Problem. AFIT/ENG/MS/18M-059. Faculty Advisor: Dr. Scott L. Nykl. Sponsor: AFRL/RQ.

STUART, THOMAS R., Integrity Monitoring for Automated Aerial Refueling: A Stereo Vision Approach. AFIT/ENG/MS/18M-062. Faculty Advisor: Dr. Scott L. Nykl. Sponsor: AFRL/RQ.

6.1.3. FACULTY RESEARCH OUTPUT

Notes: Faculty Bios can be found under their respective department listings. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

BETANCES, JOAN A., Maj, Department of Electrical and Computer Engineering

BINDEWALD, JASON M., Maj, Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

King, D., J.M. Bindewald, and G. Peterson. "Informal Team Assignment in a Pursuit-Evasion Game." The 31st International Florida Artificial Intelligence Research Society Conference (FLAIRS-31). Melbourne, FL, May 2018.

Ball, N., J.M. Bindewald, and G. Peterson. "On-line Agent Detection of Goal Changes." The 31st International Florida Artificial Intelligence Research Society Conference (FLAIRS-31). Melbourne, FL, May 2018.

Hillesheim, A., C. Rusnock, and J.M. Bindewald. "Simulation of Human-Agent Team Performance in Reduced Reliability Environments." Industrial and Systems Engineering Research Conference (ISERC 2018). Orlando, FL, May 2018.

Boubin, Jason G., Christina F. Rusnock, Jason M. Bindewald. "Quantifying Compliance and Reliance Trust Behaviors to Influence Trust in Human-Automation Teams." The Human Factors and Ergonomics Society International Annual Meeting (HFES 2017). Austin, TX, October 2017 [*Human Performance Modeling Best Student Paper Award*].

Garnick, Christopher J., Jason M. Bindewald, Christina F. Rusnock. "Designing an Automated Agent to Encourage Human Reliance." The Human Factors and Ergonomics Society International Annual Meeting (HFES 2017). Austin, TX, October 2017 [*System Development Technical Group (SDTG) David Meister Best Paper Award (#1/13)*].

Hillesheim, Anthony, Christina F. Rusnock, Michael E. Miller, Jason M. Bindewald. "Relationships between User Demographics and User Trust in an Autonomous Agent." The Human Factors and Ergonomics Society International Annual Meeting (HFES 2017). Austin, TX, October 2017.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Bindewald, Jason M., Christina F. Rusnock, Michael E. Miller. "Measuring Human Trust Behavior in Human-Machine Teams." Applied Human Factors and Ergonomics (AHFE 2017). Los Angeles, CA, July 2017.

BORGHETTI, BRETT J., Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Sample, Kenneth, Lin, Alan, C., Borghetti, Brett, J., Peterson, Gilbert, L., “Predicting Trouble Ticket Resolution”, *Proceedings of the 31st International Florida Artificial Intelligence Research Society Conference*, Melbourne, FL, 21-23 May 2018.

CARBINO, TIMOTHY J., Maj, Department of Electrical and Computer Engineering

CLINTON, JUSTIN A., Department of Engineering Physics

COBB, RICHARD G., Department of Aeronautics and Astronautics

REFEREED JOURNAL PUBLICATIONS

Prince, E. and Cobb, R., “Optimal Inspector Satellite Guidance to Quasi-Hover via Relative Teardrop Trajectories”, *Acta Astronautica*, February 15, 2018, <https://doi.org/10.1016/j.actaastro.2018.02.017>

Carr, R.W., Cobb, R.G., Pachter, M. and Pierce, S., "Solution of a Pursuit–Evasion Game Using a Near-Optimal Strategy", *Journal of Guidance, Control, and Dynamics*, Vol. 41, No. 4, 2018, pp. 841-850.
<https://doi.org/10.2514/1.G002911>.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Zollars M.D., Cobb R.G. and Grymin D.J., “Optimal Path Planning for SUAS Waypoint Following in Urban Environments”, IEEE Aerospace Conference, Big Sky MT, 3-10 March 2018.

COLLINS, PETER J., Department of Electrical and Computer Engineering

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

P. Collins, “A Novel Quadrotor-based Field Probe Concept,” 2017 RCS Measurement Facilities Technical Exchange Meeting, Las Cruces, NM, 16-18 April 2018.

COLOMBI, JOHN M., Department of Systems Engineering and Management

CORBELL, PHILLIP M., Lt Col, Department of Electrical and Computer Engineering,

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Robert Elliot Irby, Phillip Corbell, “On the Use of Machine Learning to Detect DRFMs: Sensitivity and Time-Variance Analysis,” 2018 Tri-Service Radar Conference, Monterey, CA, June 25-29 2018.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Lt Col Phillip Corbell, “Cognitive EW amongst Liars; Mapping the EW/AI Minefield,” 1st Cognitive Radar & EW Workshop, GTRI Conference Center, 13-14 December 2018.

Lt Col Phillip Corbell, “Cognitive EW in a Minefield of Lies: A Tale of Necessity and Prudence,” 2018 AOC Kittyhawk Week, ATIC, Dayton, OH, 12-14 June 2018.

CURRO, JOSEPH A., Capt, Department of Electrical and Computer Engineering

GUNARWARDENA, SANJEEV, Department of Electrical and Computer Engineering

REFEREED JOURNAL PUBLICATIONS

J. Curran, M. Arizabaleta, T. Pany, S. Gunawardena, “The Institute of Navigation’s GNSS SDR Metadata Standard,” Inside GNSS, November/December 2017. <http://insidegnss.com/wp-content/uploads/2018/01/novdec17-STANDARDS.pdf>.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

S. Pentecost, S. Gunawardena, “Dynamic Power Allocation with Constant Envelope Transmission for Next Generation Software Defined GPS Payloads,” International Technical Meeting of the Institute of Navigation, Jan 29 - Feb 1 2018, Reston VA. <https://www.ion.org/publications/abstract.cfm?articleID=15560>.

P. Patel, S. Gunawardena, R. K. Martin, “Characterization of Phase and Amplitude Quantization Effects in a Direct Digital Synthesis-based Waveform Generator for Future Software-Defined GPS Payloads,” International Technical Meeting of the Institute of Navigation, Jan 29 - Feb 1 2018, Reston VA. <https://www.ion.org/publications/abstract.cfm?articleID=15559>.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

P. Patel, N. Raquet, S. Gunawardena, J. Hinks, J. Guerrero, “Demonstration of Distortionless Flex-Power and the Effects of a Chimera-Enabled GPS Authentication Signal on Current-Generation COTS Civilian GNSS Receivers,” 2018 Joint Navigation Conference, Long Beach, CA, July 2018.

J. Egan, M. A. Temple, S. Gunawardena, “Discriminating GPS Signal Emulation Hardware,” 2018 Joint Navigation Conference, Long Beach, CA, July 2018.

T. Pany, M. Arizabaleta, S. Gunawardena, J. Curran, A. Rügamer, “ION Software-Defined Radio Metadata Standard Report: September 2018,” 31st International Technical Meeting of the Institute of Navigation: ION GNSS+ 2018, Miami FL, September 2018.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

S. Gunawardena, “Hands-on Introduction to GNSS Software Receivers and Signal Processing” 31st International Technical Meeting of the Institute of Navigation: ION GNSS+ 2018, September 2018, Miami, FL (Invited tutorial).

HODSON, DOUGLAS D., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“AFSIM Maturation and Capability Improvements.” Sponsor: AFRL/RQ. Funding: \$35,096 – Hodson 50%, Peterson 50%.

HOPKINSON, KENNETH M., Department of Electrical and Computer Engineering

JACQUES, DAVID R., Department of Systems Engineering and Management

LEISHMAN, ROBERT C., Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Skouson, M. B., Borghetti, B. J., & Leishman, R. C. (2019). URSA: A Neural Network for Unordered Point Clouds Using Constellations. In *Computer Vision Conference (CVC)* (pp. 1–11).

Leishman, R. C., Gray, J., Raquet, J., Rutkowski, A., & Myrick, W. (2018). Bounding Visual Odometry Drift with Radio Range Data for Small Unmanned Aerial Vehicles. In *ION GNSS+*. Miami, FL.

Watson, R. M., Taylor, C. N., Leishman, R. C., & Gross, J. N. (2018). Batch Measurement Covariance Estimation for Robust Localization. In *ION GNSS+* (pp. 1–10). Miami, FL.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Leishman, R.C., Awarded over \$500,000 in research grants as primary PI and another \$600,000 as a co-PI.

LIEVSAY, JAMES R., Maj, Department of Electrical and Computer Engineering

MARTIN, RICHARD K., Department of Electrical and Computer Engineering

REFEREED JOURNAL PUBLICATIONS

R. K. Martin, C. Keyser, L. Ausley, and M. Steinke, “Pixel Classification with a Temporally Multiplexed Spectropolarimetric LADAR System,” *IEEE Transactions on Geoscience and Remote Sensing*, vol. 56, no. 7, pp. 3735-3746, July 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Pranav Patel, Sanjeev Gunawardena, and Richard K. Martin, “Characterization of Phase and Amplitude Quantization Effects in a Direct Digital Synthesis-based Waveform Generator for Future Software-Defined GPS Payloads,” in \ *Proc. ION Int’l Technical Meeting (ITM)*, Reston, VA, Jan 2018, 8 pages.

MERKLE, LAURENCE D., Department of Electrical and Computer Engineering

MILLER, MICHAEL E., Department of Systems Engineering and Management

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Bindewald, J.M. Peterson, G.L., and Miller, M.E. (in revision). Creating Effective Automations that Maintain Explicit User Engagement, *IEEE Transactions on Human-Machine Systems*.

Johnson*, C., Miller, M.E., and Rusnock, C.F. (in revision). A Framework for Analyzing and Discussing Levels of Human Control Abstraction, *Journal of Cognitive Engineering and Decision Making*.

NYKL, SCOTT L., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Reconnaissance Improvement through Secure, Reduced Bandwidth Communication and Cooperative Navigation Using Jetson TX1s.” Sponsor: Undisclosed. Funding: \$5,663 – Nykl 30%, Graham 30%, Pierce 30%, Carbino 10%.

“Reconnaissance Improvement via Change Detection, Data Compression, and Communication Resilience Using Jetson TX1s and TX2s.” Sponsor: Undisclosed. Funding: \$117,420 – Nykl 50%, Graham 50%.

“Automated Aerial Refueling: Precise Relative Navigation from Stereo Vision, Phase II.” Sponsor: AFRL/RQ. Funding: \$70,000.

“Automated Aerial Refueling: Precise Relative Navigation from Stereo Vision, Phase 3.” Sponsor: AFRL/RQ. Funding: \$80,000.

REFEREED JOURNAL PUBLICATIONS

Z. Paulson, S. Nykl, J. Pecarina, and B. Woolley, "Mitigating the Effects of Boom Occlusion on Automated Aerial Refueling through Shadow Volumes," *The Journal of Defense Modeling and Simulation*, Vol. 0, No. 0, pp. 1–15, 2018, URL: <https://doi.org/10.1177/1548512918808408>.

OXLEY, MARK E., Department of Mathematics and Statistics

PACHTER, MEIR, Department of Electrical and Computer Engineering

REFEREED JOURNAL PUBLICATIONS

E. Garcia, D. Casbeer, Z. E. Fuchs and M. Pachter: "Cooperative Missile Guidance for Active Defense of Air Vehicles", *IEEE Trans. on AES*, Vol. 54, Issue 2, pp. 706-721, April 2018.

M. Pachter and T. J. Montgomery: "Visual-INS Using a Human Operator and Converted Measurements", *IEEE Trans. on Aerospace and Electronic Systems*, Vol. 53, Issue 5, pp. 2359-2371, October 2017.

M. Pachter, E. Garcia and D. Casbeer: "The Differential Game of Guarding a Target", *AIAA Journal of Guidance, Control and Dynamics*, Vol 40, No. 11, November 2017, pp. 2986 - 2993.

Ryan W. Carr, R. Cobb, M. Pachter and S. Pierce: "Solution of a Pursuit-Evasion Game Using a Near-Optimal Strategy," *AIAA J. of Guidance, Control and Dynamics* Vol. 41, No.4, April 2018, pp. 841-850.

E. Garcia, D. Casbeer and M. Pachter: "The Target differential Game with Two Defenders", *Journal of Intelligent & Robotic Systems*, 2018, pp. 87 - 106.

Pachter, M., Garcia, E. & Casbeer, D.W., "Toward a Solution of the Active Target Defense Differential Game," *Dyn Games Appl* (2018) <https://doi.org/10.1007/s13235-018-0250-1>

E. Garcia, D. Casbeer and M. Pachter: "Design and Analysis of State Feedback Optimal Strategies for the Differential Game of Active Defense," *IEEE Trans. on Automatic Control*, April 2018
<https://doi.org/10.1109/TAC.2018.2828088>

Pachter, M. & Coates, S. *Dyn Games Appl* (2018) "The Classical Homicidal Chauffeur Differential Game,"
<https://doi.org/10.1007/s13235-018-0264-8>.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

R. Anderson, M. Pachter and R. Murphey: "A 3-Player Zero-Sum Differential Game", *IEEE Aerospace Conference, Big Sky, Montana*, March 3--March 10, 2018.

R. Anderson, M. Pachter and R. Murphey: "Barrier Analysis of a 3-Player Pursuit-Evasion Differential Game", *Proceedings of the 58th Israel Annual Conference on Aerospace Sciences, Tel-Aviv & Haifa, Israel*, March 14-15, 2018.

E. Garcia, D. Casbeer and M. Pachter: "Optimal Target Capture Strategies in the Target-Attacker-Defender Differential Game", *American Control Conference, Milwaukee, Wisconsin*, June 27-29 2018.

Weintraub, E. Garcia and M. Pachter: "A Kinematic/rejoin Method for Active Defense of a Non-Maneuverable Aircraft", *American Control Conference, Milwaukee, Wisconsin*, June 27-29 2018.

PETERSON, GILBERT L., Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

King, D., Hodson, D., and Peterson, G.L., "The Role of Simulation Frameworks in Relation to Experiments," *Proceedings of the 2017 Winter Simulation Conference*, pp. 4132 – 4161, 2017.

King, D., J.M. Bindewald, and Peterson, G.L., "Informal Team Assignment in a Pursuit-Evasion Game." The 31st International Florida Artificial Intelligence Research Society Conference (FLAIRS-31). Melbourne, FL, May 2018, pp. 32-36.

Ball, N., J.M. Bindewald, and Peterson, G.L., "On-line Agent Detection of Goal Changes." The 31st International Florida Artificial Intelligence Research Society Conference (FLAIRS-31). Melbourne, FL, May 2018, pp. 294-296.

Sample, K.R., Lin, A.C, Borghetti, B.J., and Peterson, G.L., "Predicting Trouble Ticket Resolution," The 31st International Florida Artificial Intelligence Research Society Conference (FLAIRS-31). Melbourne, FL, May 2018, pp. 201-204.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Bodin, T., Bindewald, J.M., Jacques, D., and Peterson, G.L., "Development of Behavior-Based Control in an Autonomous Aerial Vehicle." Joint Navigation Conference (JNC 2017), Dayton, OH, June 2017.

PIERCE, SCOTT J., Lt Col, Department of Electrical and Computer Engineering

REFEREED JOURNAL PUBLICATIONS

Carr, R., Cobb, R., Pachter, M., Pierce, S., "Solution of a Pursuit-Evasion Game Using a Near-Optimal Strategy," *Journal of Guidance, Control, and Dynamics*, Vol. 41, No. 4 (2018), pp. 841-850.

RAQUET, JOHN F., Department of Electrical and Computer Engineering

REFEREED JOURNAL PUBLICATIONS

Cooper, M., J. Raquet, and R. Patton, "Range Information Characterization of the Hokuyo USA-20LX LIDAR Sensor," *Photonics*, Vol. 5, No. 2, <http://www.mdpi.com/2304-6732/5/2/12>, May 2018.

Cooper, M., J. Raquet, and R. Patton, "Algorithm on Converting a 2D Scanning LiDAR to 3D for use in Autonomous Indoor Navigation" *Adv Robot Autom*, Vol. 7, No. 1, <http://www.mdpi.com/2304-6732/5/2/12>, Jan 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Curro, J. and J. Raquet, "Deriving Confidence from Artificial Neural Networks for Navigation," *Proceedings of IEEE/ION PLANS 2018*, Monterey, CA, APR 2018.

Jurado, J. and J. Raquet, "Towards an Online Sensor Model Validation and Estimation Framework," *Proceedings of IEEE/ION PLANS 2018*, Monterey, CA, APR 2018.

Weathers, D. and J. Raquet, "Sound Based Positioning," *Proceedings of ION GNSS+ 2017*, Portland, OR, Sep 2017.

Leishman, R., J. Gray, and J. Raquet, "Utilization of UAV Autopilots in Vision-Based Alternative Navigation," *Proceedings of ION GNSS+ 2017*, Portland, OR, Sep 2017.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Raquet, J., "UAVs vs. Natural Autonomous Vehicles (NAVs)—Are We Closing the Gap?," Distinguished Speaker Series, Riverside, CA, May 2018.

TEMPLE, MICHAEL A., Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

J.C. Egan, M.A. Temple, S. Gunawardena, "Discriminating GPS Signal Emulation Hardware Using CS-DNA Features," 2018 Joint Nav Conf (JNC), Long Beach, CA, Jul 2018.

6.2. CENTER FOR CYBERSPACE RESEARCH

Center for Cyberspace Research (CCR)

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Executive Program Coordinator (937) 255-3636 x4602

Homepage: <http://www.afit.edu/CCR>

6.2.1. DOCTORAL DISSERTATIONS

CASEY, DANIEL J., Progressive Network Deployment, Performance, and Control with Software-Defined Networking. AFIT/ENG/DS/18M-017. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A.

DILL, RICHARD., Automating Mobile Device File Format Analysis. AFIT/ENG/DS/18S-008. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: N/A

HEFRON, RYAN G., Breaking down the barriers to operator workload estimation: Advancing algorithmic handling of temporal non-stationarity and cross-participant differences for EEG analysis using deep learning. AFIT/ENG/DS/18S-012. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: N/A.

6.2.2. MASTER'S THESES

BENTJEN, KARL C., Mitigating the Effects of Cyber Attacks and Human Control in an Autonomous Intersection. AFIT/ENG/MS/18M-008. Faculty Advisor: Dr. Scott R. Graham. Sponsor: AFRL/R.Y.

BEYER, STEVEN M., Pattern-of-Life Modeling Using Data Leakage in Smart Homes. AFIT/ENG/MS/18M-009. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A.

BORNEMAN, MARKUS M., Estimating Defensive Cyber Operator Decision Confidence. AFIT/ENG/MS/18M-013. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: 711 HPW/RH

BRADFORD-WINKLER, LUKE M., Variable Speed Simulation for Accelerated Industrial Control System Cyber Training. AFIT/ENG/MS/18M-014. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS.

BRUZA, MASON R., An Analysis of Multi-Domain Command and Control and the Development of Software Solutions through DevOps Toolsets and Practices. AFIT/ENG/MS/18M-016. Faculty Advisor: Lt Col Mark G. Reith. Sponsor: N/A.

CELEBUCKI, DANIEL J., Methods of Reverse Engineering a Bitstream for Field Programmable Gate Array Protection. AFIT/ENG/MS/18M-018. Faculty Advisor: Dr. Scott R. Graham. Sponsor: AFRL/R.Y.

CONNORS, JACOB W., Assessing the Competing Characteristics of Privacy and Safety within Vehicular Ad Hoc Networks. AFIT/ENG/MS/18M-019. Faculty Advisor: Dr. Scott R. Graham. Sponsor: N/A.

DUNN, MICHAEL H., Assessing and Expanding Extracurricular Cybersecurity Youth Activities' Impact on Career Interest. AFIT/ENG/MS/18M-021. Faculty Advisor: Dr. Laurence D. Merkle. Sponsor: AFRL.

ELLIOTT, KOLBY H., Evaluation of Resiliency in a Wide-Area Backup Protection System via Model Checking. AFIT/ENG/MS/18M-023. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: N/A.

ERVIN, RODERICK D., Detecting YARD Stick One Rogue Attacks on Insteon Home Automation Devices Using a Low Cost Software Defined Radio (SDR). AFIT/ENG/MS/18M-025. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/R.Y.

FROBERG, BRANDON P., Assured Android Execution Environments. AFIT/ENG/MS/18M-027. Faculty Advisor: Dr. Laurence D. Merkle. Sponsor: AFRL/RI.

GOODBODY, IAN R., Applying Direct GPS Spectrum Sensing Anti-jamming Receiver Solutions. AFIT/ENG/MS/18M-029. Faculty Advisor: Dr. Sanjeev Gunawardena. Sponsor: 746 TS.

GUION, JEFFREY J., Dynamic Cyber Mission Mapping. AFIT/ENG/MS/18M-030. Faculty Advisor: Lt Col Mark G. Reith. Sponsor: SAF/CIO.

HART, DANIEL D., Techniques for Low-Latency in Software-Defined Radio-Based Networks. AFIT/ENG/MS/18M-032. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RV.

JEFFRIES, BLAINE M., Securing Critical Infrastructure: A Ransomware Study. AFIT/ENG/MS/18M-034. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS.

KANNING, MATTHEW D., An Evaluation of the Cyberspace Modeling Capabilities of the Advanced Framework for Simulation, Integration and Modeling. AFIT/ENG/MS/18M-037. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: HQ AF/A9.

LAW, BRADFORD E., Passive Radiolocation of IEEE 802/11 Emitters Using Directional Antennae. AFIT/ENG/MS/18M-040. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A.

MAYER, SAMUEL A., Quality of Service Impacts of a Moving Target Defense with Software-Defined Networking. AFIT/ENG/MS/18M-045. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A.

PETERS, CHRISTIAN K., Discriminating Terrestrial Trunked Radio (TETRA) System Devices Using Distinct Native Attribute Fingerprinting. AFIT/ENG/MS/18M-053. Faculty Advisor: Maj Joan A. Betances Jorge. Sponsor: AFRL/RV.

PHAN, TIFFANY M., RSS-based Device-free Passive Detection and Localization Using Home Automation Network Radio Frequencies. AFIT/ENG/MS/18M-054. Faculty Advisor: Dr. Richard K. Martin. Sponsor: N/A.

SAMPLE, KENNETH R., Resolution Time Prediction From Air Force Network Trouble Ticket Data. AFIT/ENG/MS/18M-057. Faculty Advisor: Maj Alan C. Lin. Sponsor: N/A.

SCHELKOPH, DANIEL J., Digital Forensics Event Graph Reconstruction. AFIT/ENG/MS/18M-058. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: DC3.

SWIHART, EVAN V., Expected Coverage (ExCov): A Proposal to Compute Fuzz Test Coverage within an Infinite Input Space. AFIT/ENG/MS/18M-063. Faculty Advisor: Maj Timothy J. Carbino. Sponsor: AFRL/RV.

WILLIS, JOHN M., MIL-STD-1553 Fingerprinting Using Existing Card Functionality. AFIT/ENG/MS/18M-068. Faculty Advisor: Dr. Robert F. Mills. Sponsor: AFRL/RV.

WOLFE, CLARK L., Securing Data in Transit Using Two Channel Communication. AFIT/ENG/MS/18M-069. Faculty Advisor: Dr. Scott R. Graham. Sponsor: N/A.

6.2.3. FACULTY RESEARCH OUTPUT

Notes: Faculty Bios can be found under their respective department listings. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

BORGHETTI, BRETT J., Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Sample, Kenneth, Lin, Alan, C., Borghetti, Brett, J., Peterson, Gilbert, L., “Predicting Trouble Ticket Resolution”, *Proceedings of the 31st International Florida Artificial Intelligence Research Society Conference*, Melbourne, FL, 21-23 May 2018.

Vieane, Alex, Funke, Gregory, Greenlee, Eric, Mancuso, Vincent, Borghetti, Brett J., Miller, Brent, Menke, Lauren, Brown, Rebecca, Foroughi, Cyrus, K., and Boehm-Davis, Deborah, “Task Interruptions Undermine Cyber Defense”, *Proceedings of the 2017 Human Factors and Ergonomics Society International Conference*, Austin, TX, 9-13 October 2017 (Mark Resnick Best Paper Award Winner)

DEYOUNG, MARK, E., Lt Col, Department of Electrical and Computer Engineering

GRAHAM, SCOTT R., Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Beyer, S.M., Mullins, B.E., Graham, S.R., Bindewald, J.M., “Pattern-of-Life Modeling Using Data Leakage in Smart Homes”, *SCI-300 Specialists’ Meeting (SM) on ‘Cyber Physical Security of Defense Systems’*, Fort Walton Beach, FL (USA) 8-9 May 2018

Willis, J.M., Mills, R.F., Mailloux, L.O., Graham, S.R., “MIL-STD-1553 Device Characterization using Organic Interface Functionality”, *SCI-300 Specialists’ Meeting (SM) on ‘Cyber Physical Security of Defense Systems’*, Fort Walton Beach, FL (USA) 8-9 May 2018

Jeffries, B.M., Mullins, B.E., Graham, S.R., “Securing Critical Infrastructure: A Ransomware Study”, *International Conference of Critical Infrastructure Protection*, Mar 2018

Celebucki, D.J., Graham, S.R., Gunawardena, S., “Reversing a Lattice ECP3 FPGA for Bitstream Protection”, *International Conference of Critical Infrastructure Protection*, Mar 2018

Bentjen, K.C., Graham, S.R., Nykl, S.L., “Introducing Persistent Human Control into a Reservation-Based Autonomous Intersection Protocol”, *International Conference of Critical Infrastructure Protection*, Mar 2018

Wolfe, C.L., Graham, S.R., Mills, R.F., Nykl, S.L., Simon, P.E., “Securing Data-in-Transit for Power-Limited Sensor Networks using Two-Channel Communication”, *International Conference of Critical Infrastructure Protection*, Mar 2018

Wolfe, C.L., Graham, S.R., Simon, P.E. “Securing Data in Transit using Tunable Two Channel Communication”, *13th International Conference on Cyber Warfare and Security (ICCWS 2018)*, Mar 2018

Connors, J.W., Graham, S.R., Mailloux, L.O., “Security Implications of V2V in an Autonomous Intersection Environment”, *13th International Conference on Cyber Warfare and Security (ICCWS 2018)*, Mar 2018

Bentjen, K.C., Graham, S.R., Nykl, S.L. “Modelling Misbehavior in Automated Vehicle Intersections in a Synthetic Environment”, *13th International Conference on Cyber Warfare and Security (ICCWS 2018)*, Mar 2018

Celebucki, D.J., Lin, A.C., Graham, S.R., “A Security Evaluation of Popular Internet of Things Protocols for Manufacturers”, *2018 IEEE International Conference on Consumer Electronics (ICCE)*, Jan 2018

PATENT APPLICATIONS

Reber, P.E., Graham, S.R., Sweeney, P.J., Stephensen, M.M., “Active Attestation of Embedded systems,” Provisional application number 62635204. Filed 26 Feb 18 . [CCR]

GRMAILA, MICHAEL R., Department of Systems Engineering and Management

GUNAWARDENA, SANJEEV, Department of Electrical and Computer Engineering

HODSON, DOUGLAS D., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“AFSIM Maturation and Capability Improvements.” Sponsor: AFRL/RQ. Funding: \$35,096 – Hodson 50%, Peterson 50%.

HOPKINSON, KENNETH M., Department of Electrical and Computer Engineering

LIN, ALAN C. Maj, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Multi-domain Scenario-based Wargaming.” Sponsor: 711 HPW. Funding: \$59,946 – Lin 67%, Peterson 33%.

MAGNUS, AMY L., Department of Mathematics and Statistics

SPONSOR FUNDED RESEARCH PROJECTS

“Distributed Intelligence and the Nature of Mature Work.” Sponsor: AFOSR. Funding: \$150,380 – Magnus 90%, Oxley 10%.

MARTIN, RICHARD K., Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

R. K. Martin and A. G. Klein, “Improved Student Independence Through Competitive Tinkering,” in *Proc. Frontiers in Education (FIE)*, Indianapolis, IN, Oct 2017, 8 pages.

Kevin J. Richardson, Harley J. Fernandez, Kirsten R. Basinet, Andrew G. Klein, and Richard K. Martin, “A Making and Gaming Approach to Learning About RF Path Loss and Antenna Design,” in *IEEE Integrated STEM Conference (ISEC)*, Princeton, NJ, March 2018, 7 pages.

R. K. Martin, K. R. Basinet, J. Rosenblum, A. Schwartz, and A. G. Klein, “Gamification of DSP: Electronic vs. Pen-and-Paper,” in *Proc. Int. Conf. on Acoustics, Speech, and Signal Proc. (ICASSP)*, Calgary, Alberta, Canada, April 2018, 5 pages.

MAYBECK, PETER S., Department of Electrical and Computer Engineering

MERKLE, LAURENCE D., Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

M. H. Dunn and L. D. Merkle. Software Security in Direct-Recording Electronic Voting Machines. 13th International Conference on Cyber Warfare and Security, Washington, DC, 9 Mar 2018.

M. H. Dunn and L. D. Merkle. Assessing the Impact of a National Cybersecurity Competition on Students' Career Interests. 49th ACM Technical Symposium on Computer Science Education, Baltimore, MD, 22 Feb 2018.

B. P. Froberg and L. D. Merkle. Ensuring Android Execution Containers with Formal Methods. 64th Annual Reliability and Maintainability Symposium, Reno, NV, 25 Jan 2018.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

M. H. Dunn, R. J. Caruso, L. D. Merkle, and R Trygstad. Proposed Cybersecurity Merit Badge for the Boy Scouts of America. Poster presented at 49th ACM Technical Symposium on Computer Science Education, Baltimore, MD, 23 Feb 2018.

M. H. Dunn, R. J. Caruso, P. T. Craven, L. Frost, L. D. Merkle, J. M. Pittman, and R. Trygstad. Proposed Cybersecurity Merit Badge for the Boy Scouts of America. Poster presented at 22nd Colloquium for Information Systems Security Education, New Orleans, LA, 9-13 Jun 2018.

M. H. Dunn and L. D. Merkle. The Role of Extracurricular Activities in Cybersecurity Education. Presented at the New Approaches to Cybersecurity Education Workshop, New Orleans, LA, 9-10 Jun 2018.

MILLAR, JEREMY R., Maj, Department of Electrical and Computer Engineering

MILLS, ROBERT F., Department of Electrical and Computer Engineering

REFEREED JOURNAL PUBLICATIONS

Span, M., Mailloux, L.O., Mills, R.F., and Young, W., "Conceptual Systems Security Requirements Analysis: Aerial Refueling Case Study", accepted for IEEE Access, 30 Jul 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Burfeind, B.C., Mills, R.F., and Beach, P.M., "Securing Airborne Crowdsensing Networks", Digital Avionics Systems Conference (DASC 2018), Sept 2018.

Beach, P.M., Mills, R.F., *Burfeind, B.C., Langhals, B.T., and Mailloux, L.O., "A STAMP-Based Approach to Developing Quantifiable Measures of Resilience", 16th International Conference on Embedded Systems, Cyber-Physical Systems, and Applications (ESCS'18), Jul 2018.

Willis, J.M., Mills, R.F., Mailloux, L.O., Graham, S.R., "MIL-STD-1553 Device Characterization using Organic Interface Functionality", NATO Symposium on Cyber Physical Security of Defense Systems, May 2018, Ft Walton Beach FL, pp 1-17.

Wolfe, C.L., Graham, S.R., Mills, R.F., Nykl, S.L., and Simon, P.E., "Securing Data-in-Transit for Power-Limited Sensor Networks using Two-Channel Communication", International Conference of Critical Infrastructure Protection, Mar 2018.

Willis, J.M., Mills, R.F., Mailloux, L.O., and Graham, S.R., "Considerations for Secure and Resilient Satellite Architectures", International Conference on Cyber Conflict (CyCon US), Washington DC, Nov 2017, pp 16 - 22.

MULLINS, BARRY E., Department of Electrical and Computer Engineering,

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

L. Bradford, B E. Mullins, S. Dunlap, and M. Reith, "Developing Low-cost and Effective ICS Cyber Training Environments", *13th International Conference on Cyber Warfare and Security ICCWS-2018*, Washington DC, 8-9 March 2018, pp. 47-51.

S. Mayer, M. Reith, and B E. Mullins, “Look Again Neo: A Software Defined Networking Moving Target Defense”, *13th International Conference on Cyber Warfare and Security ICCWS-2018*, Washington DC, 8-9 March 2018, pp. 602-610.

NYKL, SCOTT L., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Reconnaissance Improvement through Secure, Reduced Bandwidth Communication and Cooperative Navigation Using Jetson TX1s.” Sponsor: Undisclosed. Funding: \$5,663 – Nykl 30%, Graham 30%, Pierce 30%, Carbino 10%.

“Reconnaissance Improvement via Change Detection, Data Compression, and Communication Resilience Using Jetson TX1s and TX2s.” Sponsor: Undisclosed. Funding: \$117,420 – Nykl 50%, Graham 50%.

“Automated Aerial Refueling: Precise Relative Navigation from Stereo Vision, Phase 3.” Sponsor: AFRL/RQ. Funding: \$80,000.

PETERSON, GILBERT L., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Autonomy Capability Design and Development.” Sponsor: 711 HPW. Funding: \$280,000.

REFEREED JOURNAL PUBLICATIONS

Jordan, P.L., Peterson, G.L., Lin, A.C., Mendenhall, M.J., Sellers, A.J., Narrowing the Scope of Failure Prediction Using Targeted Fault Load Injections, *IEEE Transactions on Enterprise Information Systems*, vol. 12(5): 587-602, 2017 (<https://doi.org/10.1080/17517575.2017.1390167>).

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Sample, K.R., Lin, A.C, Borghetti, B.J., and Peterson, G.L., ‘Predicting Trouble Ticket Resolution,’ The 31st International Florida Artificial Intelligence Research Society Conference (FLAIRS-31). Melbourne, FL, May 2018, pp. 201-204.

BOOKS AND CHAPTERS IN BOOKS

Good, R., and Peterson, G., Automated File Provenance Collection, In Peterson, G., Sheno, S. (eds), *Advances in Digital Forensics XIII*, 2017.

Jordan P., Van Patten D., Peterson G., Sellers A. (2018) Distributed PowerShell Load Generator (D-PLG): A Tool for Generating Dynamic Network Traffic. In: Obaidat M., Ören T., Merkuriev Y. (eds) *Simulation and Modeling Methodologies, Technologies and Applications. SIMULTECH 2016. Advances in Intelligent Systems and Computing*, vol 676. Springer, Cham

REITH, MARK G., Lt Col, Department of Electrical and Computer Engineering

TEMPLE, MICHAEL A., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Application of RF-DNA to Enhance Transition of Functional Materials, Devices, and Components.” Sponsor: AFRL/RX. Funding: \$120,000 – Temple 50%, Carbino 50%.

“(U) Application of DML to RFINT.” Sponsor: Undisclosed. Funding: \$49,944.

“RF-EW Systems Support.” Sponsor: AFRL/RY. Funding: \$75,000.

“Application of RF-DNA to Enhance Transition of Functional Materials, Devices, and Components.” Sponsor: AFRL/RX. Funding: \$120,000 – Temple 50%, Carbino 50%.

6.3. CENTER FOR DIRECTED ENERGY

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Executive Administrator (937) 255-3636 x4551

Homepage: <http://www.afit.edu/CDE>

6.3.1. DOCTORAL DISSERTATION

ADOMANIS, BRYAN M., Design and Optimization of Plasmonic 3-D Huygens Metasurface Building Blocks for Highly-Efficient Flat Optics. AFIT/ENP/DS/18S-018. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: AFOSR.

DAVILA, RICARDO C., Two-Photon Excitation of Cesium Alkali Metal Vapor 72D, 82D Kinetics and Spectroscopy. AFIT/ENP/DS/18M-076. Faculty Advisor: Dr. Glen P. Perram. Sponsor: MDA.

MORRILL, DANA F., Numerical Simulation of High Energy Laser Propagation. AFIT/ENC/DS/18S-003. Faculty Advisor: Dr. Benjamin F. Akers. Sponsor: N/A.

PAULEC, MASON D., Reconstruction of the 3D Temperature and Species Concentration Spatial Distribution of a Jet Engine Exhaust Plume Using an Infrared Fourier Transform Spectrometer Hyperspectral Imager. AFIT/ENP/DS/18S-025. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: N/A.

VAN ZANDT, NOAH R., The Benefits of Polychromatic Speckle Mitigation for Shake Hartmann Wavefront Sensors. AFIT/ENP/DS/17D-009. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: AFRL/RD.

6.3.2. FACULTY RESEARCH OUTPUT

Notes: Faculty Bios can be found under their respective department listings. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

AKERS, BENJAMIN F., Department of Mathematics and Statistics

SPONSOR FUNDED RESEARCH PROJECTS

“Applications of Radial Basis Functions.” Sponsor: AFOSR. Funding: \$33,990 – Akers 50%, Reeger 50%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Morrill, D. and Akers, B., “High Energy Laser Propagation: Environmental Effects,” Imaging and Applied Optics, PW1D.4, 2017.

BOSE-PILLAI, SANTASRI R. Department of Engineering Physics

REFEREED JOURNAL PUBLICATIONS

Bose-Pillai, S. R., J.E. McCrae, C.A. Rice, R.A. Wood, C.E. Murphy, and S.T. Fiorino, “Estimation of atmospheric turbulence using differential motion of extended features in time-lapse imagery,” Optical Engineering, vol. 57, no.10, 104108 (14pp.), 2018, doi: 10.1117/1.OE.57.10.104108.

Milo W. Hyde, Santasri R. Bose-Pillai, and Olga Korotkova, "Monte Carlo simulations of three-dimensional electromagnetic Gaussian Schell-model sources," *Optics Express*, vol. 26, no. 3, pp. 2303-2313, Feb 2018, doi: 10.1364/OE.26.002303.

Milo W. Hyde IV, Santasri R. Bose-Pillai, Xifeng Xiao, and David G. Voelz, "Physical realization of Schell-model sources using a fast steering mirror," *Microwave and Optical Technology Letters*, vol. 59, no. 11, pp. 2731-2735, Nov 2017, doi: 10.1002/mop.30818.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Sukanta Basu, Santasri Bose-Pillai, Steven Fiorino, and Jack McCrae, "Evaluating a Coupled Mesoscale Modeling and Ray Tracing Framework over an Urban Area," in *Propagation Through and Characterization of Atmospheric and Oceanic Phenomena, OSA Technical Digest (online) (OSA, 2018)*, paper PW3H.3.

Jack E. McCrae, Santasri R. Bose-Pillai, Steven T. Fiorino, and Milo W. Hyde IV, "Improved Filtering of Source Plane Tilts for Optical Propagation Simulations," 2018 IEEE Aerospace Conference, Big Sky, MT, 3-10 Mar 2018.

Jack E. McCrae, Connor E. Murphy*, Santasri R. Bose-Pillai, Christopher A. Rice, and Steven T. Fiorino, "The Influence of Wind on Anisotropy in Optical Turbulence," 2018 IEEE Aerospace Conference, Big Sky, MT, 3-10 Mar 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

S.T. Fiorino, S.R. Bose-Pillai, and K.J. Keefer, "In-Situ, Field Profiling of Turbulence Conservative Passive Scalars Using 3D Sonic Anemometers," 13th Annual Directed Energy Systems Symposium, Portsmouth, VA, September 2018.

J. E. Schmidt, S.T. Fiorino, S. Bose-Pillai, B. Elmore, K.J. Keefer, and J. Bills*, "Combining HPC and 4D Weather Cubes for Practical DE Decision Aids and System Performance Trades," 13th Annual Directed Energy Systems Symposium, Portsmouth, VA, September 2018.

J. McCrae, S.T. Fiorino, and S. Bose-Pillai, "Profiling Atmospheric Turbulence with Moon Imagery," 13th Annual Directed Energy Systems Symposium, Portsmouth, VA, September 2018.

S. R. Bose-Pillai, J. McCrae, C. Rice, and S.T. Fiorino, "First Look at Profiling Atmospheric Turbulence along a Path using the Hartmann Turbulence Sensor," 13th Annual Directed Energy Systems Symposium, Portsmouth, VA, September 2018.

Jack E. McCrae, Santasri R. Bose-Pillai, Christopher A. Rice, and Steven T. Fiorino, "Global tilt removal on a Hartmann turbulence sensor ", Proc. SPIE 10770, Laser Communication and Propagation through the Atmosphere and Oceans VII, 107700V (18 Sep 2018).

Santasri R. Bose-Pillai, Jack E. McCrae, Matthew D. Wilson*, Andrew L. Back*, Christopher A. Rice, and Steven T. Fiorino, "Profiling of atmospheric turbulence along a path using two beacons and a Hartmann turbulence sensor", Proc. SPIE 10772, Unconventional and Indirect Imaging, Image Reconstruction, and Wavefront Sensing 2018 , 107720C (18 Sep 2018).

Santasri R. Bose-Pillai, Jack E. McCrae, Ryan A. Wood*, Connor E. Murphy*, Christopher A. Rice, and Steven T. Fiorino, "Characterizing atmospheric turbulence over long paths using time-lapse imagery", Proc. SPIE 10650, Long-Range Imaging III, 106500A (11 May 2018).

Santasri Bose-Pillai, Jack McCrae, Christopher Rice, and Steven Fiorino, "Characterizing atmospheric turbulence over long paths using time-lapse imagery," 20th Annual DEPS S+T Symposium, Oxnard, CA, 26 Feb – 02 Mar, 2018.

Jack McCrae, Santasri Bose-Pillai, Christopher Rice, and Steven Fiorino, "Analysis of Tilt Removed Hartmann Turbulence Sensor Data," 20th Annual DEPS S+T Symposium, Oxnard, CA, 26 Feb – 02 Mar, 2018.

Steven Fiorino, Kevin Keefer, Jack McCrae, and Santasri Bose-Pillai, "Advantages of Quantifying Velocity Structure Function, C_v^2 to Infer Refractive Structure Function, C_n^2 ," 20th Annual DEPS S+T Symposium, Oxnard, CA, 26 Feb – 02 Mar, 2018.

PATENT APPLICATIONS

Milo W. Hyde and Santasri R. Bose-Pillai, "Generation of Vector Partially Coherent Optical Sources Using Phase-Only Spatial Light Modulators", provisional application filed in Oct 2017.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Participated in a joint atmospheric characterization field campaign with AFRL RYM in April, 2018.

Participated and gave an invited talk at AFRL RD's Distributed Volume Turbulence Working Group meeting on AFIT's efforts in characterizing the lower atmosphere.

BURGI, KENNETH, W., Lt Col, Department of Engineering Physics

BUTLER, SAMUEL D., Maj, Department of Engineering Physics

COBB, RICHARD G., Department of Aeronautics and Astronautics

FERDINANDUS, MANUEL R., Maj, Department of Engineering Physics

FIORINO, STEVEN T., Department of Engineering Physics

REFEREED JOURNAL PUBLICATIONS

Van Zandt, N. R., M. F. Spencer, M. J. Steinbock, B. M. Anderson, M. W. Hyde, and S. T. Fiorino, 2018: "Polychromatic wave-optics models for image-plane speckle. 2. Unresolved objects," *Appl. Opt.* **57**, 4103-4110.

Van Zandt, N. R., J. E. McCrae, M. F. Spencer, M. J. Steinbock, M. W. Hyde, and S. T. Fiorino, 2018: "Polychromatic wave-optics models for image-plane speckle. 1. Well-resolved objects," *Appl. Opt.* **57**, 4090-4102.

Burley, J.L., S.T. Fiorino, B. Elmore, and J. Schmidt, 2017: "A Fast Calculating Two-Stream-Like Multiple Scattering Algorithm that Captures Azimuthal and Elevation Variations" *J. Appl. Meteor. Climatol.* **56**:11, pp. 3049-3063. DOI:10.1175/JAMC-D-17-0044.1.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

McCrae, J.E., S.R. Bose-Pillai, C.A. Rice, and S.T. Fiorino, "Global tilt removal on a Hartmann turbulence sensor ", Proc. SPIE 10770, Laser Communication and Propagation through the Atmosphere and Oceans VII, 107700V (18 Sep 2018).

Bose-Pillai, S.R., J.E. McCrae, M.D. Wilson*, A.L. Back, C.A. Rice, and S.T. Fiorino, "Profiling of atmospheric turbulence along a path using two beacons and a Hartmann turbulence sensor", Proc. SPIE 10772, Unconventional and Indirect Imaging, Image Reconstruction, and Wavefront Sensing 2018,107720C, (18 Sep 2018).

Fiorino S.T., K. Keefer, A. Archibald, and L. Burchett, "An Analysis of Near-Surface Optical Turbulence and Aerosol Concentration Coupling during a Solar Eclipse," in Propagation Through and Characterization of Atmospheric and Oceanic Phenomena (pcAOP), Orlando, FL, (OSA, 27 June 2018). Invited.

Basu, S. S. Bose-Pillai, S.T. Fiorino, and J.E. McCrae, "Evaluating a Coupled Mesoscale Modeling and Ray Tracing Framework over an Urban Area," in Propagation Through and Characterization of Atmospheric and Oceanic Phenomena (pcAOP), OSA Orlando, FL, (OSA, 25-28 Jun 2018).

Bose-Pillai, S.R., J.E. McCrae, R.A. Wood, C.E. Murphy, C.A. Rice, S.T. Fiorino, "Characterizing atmospheric turbulence over long paths using time-lapse imagery", Proc. SPIE 10650, Long-Range Imaging III, 106500A (11 May 2018); doi: 10.1117/12.2305077.

McCrae, J.E. S.R. Bose-Pillai, S.T. Fiorino, and M.W. Hyde IV, "Improved Filtering of Source Plane Tilts for Optical Propagation Simulations," 2018 IEEE Aerospace Conference, Big Sky, MT, 3-10 Mar 2018.

McCrae, J.E. C.E. Murphy, S.R. Bose-Pillai, C.A. Rice, and S.T. Fiorino, "The Influence of Wind on Anisotropy in Optical Turbulence," 2018 IEEE Aerospace Conference, Big Sky, MT, 3-10 Mar 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Fiorino, S.T., S.R. Bose-Pillai, and K.J. Keefer, "In-Situ, Field Profiling of Turbulence Conservative Passive Scalars Using 3D Sonic Anemometers," 13th Annual Directed Energy Systems Symposium, Portsmouth, VA, September 2018.

Schmidt, J., S.T. Fiorino, S. Peckham, and K.J. Keefer, "Evaluation of Aerosol Models in Emerging High Energy Laser Modeling Technologies," 13th Annual Directed Energy Systems Symposium, Portsmouth, VA, September 2018.

Schmidt, J., S.T. Fiorino, S. Bose-Pillai, B. Elmore, K.J. Keefer, and J. Bills, "Combining HPC and 4D Weather Cubes for Practical DE Decision Aids and System Performance Trades," 13th Annual Directed Energy Systems Symposium, Portsmouth, VA, September 2018.

Shelters, B., S.T. Fiorino, B. Elmore, J. Bills, J. Schmidt, and M. Husk, "Attenuation Statistics Derivation in the V&W Bands Using 4D Weather Cubes," 13th Annual Directed Energy Systems Symposium, Portsmouth, VA, September 2018.

McCrae, J., S.T. Fiorino, and S. Bose-Pillai, "Profiling Atmospheric Turbulence with Moon Imagery," 13th Annual Directed Energy Systems Symposium, Portsmouth, VA, September 2018.

Bose-Pillai, S.R., J. McCrae, C. Rice, and S.T. Fiorino, "First Look at Profiling Atmospheric Turbulence along a Path using the Hartmann Turbulence Sensor," 13th Annual Directed Energy Systems Symposium, Portsmouth, VA, September 2018.

Marquet, L., S. Hammel, and S.T. Fiorino, "Propagation Path Characterization System (PCS) for LWS Support," 13th Annual Directed Energy Systems Symposium, Portsmouth, VA, September 2018.

Wolfmeyer, S., G. Thomas, and S.T. Fiorino, "Coupled Surface Observations of Temperature, Pressure, and Humidity with Surface Aerosol Particle Counts for Daytime Sky Radiance Quantification," 2018 Atmospheric Transmission Models-Modeling in Remote Sensing Meeting, Newton, MA, 5 June 2018.

Thomas, G., R. Cobb, S.T. Fiorino, and M. Hawks, "Daytime Sky Radiance Model Validation of GEO-belt in NIR-SWIR," 2018 Atmospheric Transmission Models-Modeling in Remote Sensing Meeting, Newton, MA, 5 June 2018.

Fiorino, S.T., K. Keefer, C. Rice, J. Burley, and J. Schmidt, "Characterizing Multispectral Vertical Profiles of Aerosol Extinction with Surface-based Measurements," Directed Energy Professional Society 20th Annual DE Science and Technology Symposium, Oxnard, CA (February 2018).

Fiorino, S.T., and J.E. McCrae, "Use of a Fast Scaling Law Model to Determine Optimal Array Configuration for Incoherent or Coherent Beam Combination," Directed Energy Professional Society 20th Annual DE Science and Technology Symposium, Oxnard, CA (February 2018).

Fiorino, S.T., K. Keefer, J.E. McCrae, S.R. Bose-Pillai, "Advantages of Quantifying Velocity Structure Function, C_v^2 to Infer Refractive Structure Function, C_n^2 ," Directed Energy Professional Society 20th Annual DE Science and Technology Symposium, Oxnard, CA (February 2018).

Bose-Pillai, S.R., J.E. McCrae, C.A. Rice, and S.T. Fiorino, "Characterizing atmospheric turbulence over long paths using time-lapse imagery" Directed Energy Professional Society 20th Annual DE Science and Technology Symposium, Oxnard, CA (February 2018).

McCrae, J.E., S.R. Bose-Pillai, C.A. Rice, and S.T. Fiorino, "Analysis of Tilt Removed Hartmann Turbulence Sensor Data," Directed Energy Professional Society 20th Annual DE Science and Technology Symposium, Oxnard, CA (February 2018).

Fiorino, S.T., K.J. Keefer, C.A. Rice, J.L. Burley, and J. Schmidt, "Characterizing Multispectral Vertical Profiles of Aerosol Extinction with Surface-Based Measurements," 22nd Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface (IOAS-AOLS), 98th Annual American Meteorological Society Meeting, Austin, TX, Jan 2018. (Poster and webposting: <https://ams.confex.com/ams/98Annual/webprogram/Paper335342.html>).

Burley, J.L., Fiorino, S.T., B.J. Elmore, and J. Schmidt, "A Remote Sensing and Atmospheric Compensation Tool for Assessing Multi-Spectral Radiative Transfer Properties through Realistic Atmospheres and Clouds," 22nd Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface (IOAS-AOLS), 98th Annual American Meteorological Society Meeting, Austin, TX, Jan 2018. (Poster and webposting: <https://ams.confex.com/ams/98Annual/webprogram/Paper336039.html>).

BOOKS AND CHAPTERS IN BOOKS

Schmidt J., J. Burley, B. Elmore, S. Fiorino, K. Keefer, and N. Van Zandt, 2018: "4D Weather Cubes and defense applications." *Defense Innovation Handbook*. Badiru & Barlow eds, CRC press, Chapter 14, pp. 432.

INVENTION DISCLOSURES

"A method for characterizing atmospheric full-electromagnetic spectrum propagation performance in an expeditionary setting using 4-D numerical weather prediction (NWP) data fields." Inventors: Hallenborg, Hammel, Wiss, Holt, Frederickson, Fiorino, Flagg, Haack, Campbell, Rogers, Horgan, Wang, McBryde, and Gordon. Filed at SPAWAR, Pacific, September 2018.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Bose-Pillai, S. R., J.E. McCrae, C.A. Rice, R.A. Wood, C.E. Murphy, and S.T. Fiorino, "Estimation of atmospheric turbulence using differential motion of extended features in time-lapse imagery," *Optical Engineering*, vol. 57, no.10, 104108 (14pp.), 2018, doi: 10.1117/1.OE.57.10.104108.

Burley, J.L., S.T. Fiorino, B. Elmore, and J. Schmidt, "A Remote Sensing and Atmospheric Correction Tool for Assessing Multi-Spectral Radiative Transfer through Realistic Atmospheres and Clouds" early online release *JTECH*. <https://doi.org/10.1175/JTECH-D-18-0078.1>.

GROSS, KEVIN C., Department of Engineering Physics

HAWKS, MICHAEL R., Department of Engineering Physics

MARCINIAK, MICHAEL A., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECT

"Discontinuous Phase Surfaces for Low-Profile Infrared Optics." Sponsor: AFOSR. Funding: \$60,900.

MCCRAE, JACK E., Jr., Department of Engineering Physics

REFEREED JOURNAL PUBLICATIONS

Bose-Pillai, S. R., J.E. McCrae, C.A. Rice, R.A. Wood, C.E. Murphy, and S.T. Fiorino, "Estimation of atmospheric turbulence using differential motion of extended features in time-lapse imagery," *Optical Engineering*, vol. 57, no.10, 104108 (14pp.), 2018, doi: 10.1117/1.OE.57.10.104108.

Van Zandt, N. R., J. E. McCrae, M. F. Spencer, M. J. Steinbock, M. W. Hyde, and S. T. Fiorino, "Polychromatic wave-optics models for image-plane speckle. 1. Well-resolved objects," *Appl. Opt.* **57**, 4090-4102 (2018)

Hyde IV, M. W., J. E. McCrae, and G. A. Tyler, "Target-based coherent beam combining of an optical phased array fed by a broadband laser source", *Journal of Modern Optics*, Vol. 64, Iss. 20, 2017.
doi:10.1080/09500340.2017.1343403

Van Zandt, N. R., J. E. McCrae, M. F. Spencer, M. J. Steinbock, M. W. Hyde, and S. T. Fiorino, 2018: "Polychromatic wave-optics models for image-plane speckle. 1. Well-resolved objects," *Appl. Opt.* **57**, 4090-4102.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Sukanta Basu, Santasri Bose-Pillai, Steven Fiorino, and Jack McCrae, "Evaluating a Coupled Mesoscale Modeling and Ray Tracing Framework over an Urban Area," in *Propagation Through and Characterization of Atmospheric and Oceanic Phenomena, OSA Technical Digest (online) (OSA, 2018)*, paper PW3H.3.

Jack E. McCrae, Santasri R. Bose-Pillai, Steven T. Fiorino, and Milo W. Hyde IV, "Improved Filtering of Source Plane Tilts for Optical Propagation Simulations," 2018 IEEE Aerospace Conference, Big Sky, MT, 3-10 Mar 2018.

Jack E. McCrae, Connor E. Murphy, Santasri R. Bose-Pillai, Christopher A. Rice, and Steven T. Fiorino, "The Influence of Wind on Anisotropy in Optical Turbulence," 2018 IEEE Aerospace Conference, Big Sky, MT, 3-10 Mar 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

J. McCrae, S.T. Fiorino, and S. Bose-Pillai, "Profiling Atmospheric Turbulence with Moon Imagery," 13th Annual Directed Energy Systems Symposium, Portsmouth, VA, September 2018.

S. R. Bose-Pillai, J. McCrae, C. Rice, and S.T. Fiorino, "First Look at Profiling Atmospheric Turbulence along a Path using the Hartmann Turbulence Sensor," 13th Annual Directed Energy Systems Symposium, Portsmouth, VA, September 2018.

Jack E. McCrae, Santasri R. Bose-Pillai, Christopher A. Rice, and Steven T. Fiorino, "Global tilt removal on a Hartmann turbulence sensor ", *Proc. SPIE 10770, Laser Communication and Propagation through the Atmosphere and Oceans VII*, 107700V (18 Sep 2018).

Santasri R. Bose-Pillai, Jack E. McCrae, Matthew D. Wilson, Andrew L. Back, Christopher A. Rice, and Steven T. Fiorino, "Profiling of atmospheric turbulence along a path using two beacons and a Hartmann turbulence sensor", *Proc. SPIE 10772, Unconventional and Indirect Imaging, Image Reconstruction, and Wavefront Sensing 2018* , 107720C (18 Sep 2018).

Santasri R. Bose-Pillai, Jack E. McCrae, Ryan A. Wood, Connor E. Murphy, Christopher A. Rice, and Steven T. Fiorino, "Characterizing atmospheric turbulence over long paths using time-lapse imagery", *Proc. SPIE 10650, Long-Range Imaging III*, 106500A (11 May 2018).

Santasri Bose-Pillai, Jack McCrae, Christopher Rice, and Steven Fiorino, "Characterizing atmospheric turbulence over long paths using time-lapse imagery," 20th Annual DEPS S+T Symposium, Oxnard, CA, 26 Feb – 02 Mar, 2018.

Fiorino, S.T., and J.E. McCrae, "Use of a Fast Scaling Law Model to Determine Optimal Array Configuration for Incoherent or Coherent Beam Combination," Directed Energy Professional Society 20th Annual DE Science and Technology Symposium, Oxnard, CA (February 2018).

Jack McCrae, Santasri Bose-Pillai, Christopher Rice, and Steven Fiorino, "Analysis of Tilt Removed Hartmann Turbulence Sensor Data," 20th Annual DEPS S+T Symposium, Oxnard, CA, 26 Feb – 02 Mar, 2018.

Steven Fiorino, Kevin Keefer, Jack McCrae, and Santasri Bose-Pillai, “Advantages of Quantifying Velocity Structure Function, C_v^2 to Infer Refractive Structure Function, C_n^2 ,” 20th Annual DEPS S+T Symposium, Oxnard, CA, 26 Feb – 02 Mar, 2018.

MORRILL, DANA F., Maj, Department of Mathematics and Statistics

PERRAM, GLEN P., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“Wave Front Sensing for Laser Weapon Applications.” Sponsor: AFRL/RD. Funding: \$100,000 – Perram 80%, Rice 20%.

“HEL Analysis Tool. Phase IIE. Model Enhancements and Validation.” Sponsor: MDA (Creare). Funding: \$150,000 – Perram 60%, Rice 40%.

“Melt Pool Monitoring for Metal Additive Manufacturing.” Sponsor: Navy STTR (ATS-MER, LLC). Funding: \$29,000.

“In-Process Monitoring of Additive Manufacturing: Phase IIX, Inconel Spectra and Imagery.” Sponsor: NASA (UTC). Funding: \$76,800.

PHILLIPS, GRADY T., Department of Engineering Physics

REEGER, JONAH A., Maj, Department of Mathematics and Statistics

RICE, CHRISTOPHER A., Department of Engineering Physics

REFEREED JOURNAL PUBLICATIONS

Bose-Pillai, S. R., J.E. McCrae, C.A. Rice, R.A. Wood, C.E. Murphy, and S.T. Fiorino, “Estimation of atmospheric turbulence using differential motion of extended features in time-lapse imagery,” *Optical Engineering*, vol. 57, no.10, 104108 (14pp.), 2018, doi: 10.1117/1.OE.57.10.104108.

Miller, W. S., Rice, C. A., & Perram, G. P. (2018). Temperature dependence of the helium induced broadening and shift of the Rb D1 and D2 lines. *Journal of Quantitative Spectroscopy and Radiative Transfer*, 206, 151–156. <http://doi.org/10.1016/J.JQSRT.2017.11.001>

Fletcher, A., Turner, D., Fairchild, S., Rice, C., & Pitz, G. (2018). ToF-SIMS Characterization of Robust Window Material for Use in Diode Pumped Alkali Lasers. *Physica Status Solidi (A)*, 215(2), 1700728. <http://doi.org/10.1002/pssa.201700728>

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Jack E. McCrae, Connor E. Murphy, Santasri R. Bose-Pillai, Christopher A. Rice, and Steven T. Fiorino, “The Influence of Wind on Anisotropy in Optical Turbulence,” 2018 IEEE Aerospace Conference, Big Sky, MT, 3-10 Mar 2018.

McCrae, J.E. C.E. Murphy, S.R. Bose-Pillai, C.A. Rice, and S.T. Fiorino, “The Influence of Wind on Anisotropy in Optical Turbulence,” 2018 IEEE Aerospace Conference, Big Sky, MT, 3-10 Mar 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

- S. R. Bose-Pillai, J. McCrae, C. Rice, and S.T. Fiorino, "First Look at Profiling Atmospheric Turbulence along a Path using the Hartmann Turbulence Sensor," 13th Annual Directed Energy Systems Symposium, Portsmouth, VA, September 2018.
- Jack E. McCrae, Santasri R. Bose-Pillai, Christopher A. Rice, and Steven T. Fiorino, "Global tilt removal on a Hartmann turbulence sensor ", Proc. SPIE 10770, Laser Communication and Propagation through the Atmosphere and Oceans VII, 107700V (18 Sep 2018).
- Santasri R. Bose-Pillai, Jack E. McCrae, Matthew D. Wilson, Andrew L. Back, Christopher A. Rice, and Steven T. Fiorino, "Profiling of atmospheric turbulence along a path using two beacons and a Hartmann turbulence sensor", Proc. SPIE 10772, Unconventional and Indirect Imaging, Image Reconstruction, and Wavefront Sensing 2018 , 107720C (18 Sep 2018).
- Bose-Pillai, S.R., J.E. McCrae, R.A. Wood*, C.E. Murphy, C.A. Rice, S.T. Fiorino, "Characterizing atmospheric turbulence over long paths using time-lapse imagery", Proc. SPIE 10650, Long-Range Imaging III, 106500A (11 May 2018); doi: 10.1117/12.2305077.
- Douglas E. Thornton, Mark F. Spencer, Christopher A. Rice, and Glen P. Perram, "Efficiency measurements for a digital-holography system" Proc SPIE 1065004, Defense and Security, Apr 2018.
- Santasri Bose-Pillai, Jack McCrae, Christopher Rice, and Steven Fiorino, "Characterizing atmospheric turbulence over long paths using time-lapse imagery," 20th Annual DEPS S+T Symposium, Oxnard, CA, 26 Feb – 02 Mar, 2018.
- Jack McCrae, Santasri Bose-Pillai, Christopher Rice, and Steven Fiorino, "Analysis of Tilt Removed Hartmann Turbulence Sensor Data," 20th Annual DEPS S+T Symposium, Oxnard, CA, 26 Feb – 02 Mar, 2018.
- Bose-Pillai, S., Rice C. A., McCrae, J., *et. al.* Characterizing Atmospheric Turbulence over Long Paths using Time-lapse Imagery. 2018 Annual Directed Energy S&T Symposium, Oxnard, CA.
- McCrae, J., Rice C. A., Bose-Pillai, S., *et. al.* Analysis of Tilt Removed Hartmann Turbulence Sensor Data. 2018 Annual Directed Energy S&T Symposium, Oxnard, CA.
- Eshel, B., Peterson, R., Rice, C. A., & Perram, G. Scaling Potential of the Diode-Pumped Rare Gas Laser. 2018 Annual Directed Energy S&T Symposium, Oxnard, CA.
- Fiorino, S.T., K. Keefer, C. Rice, J. Burley*, and J. Schmidt, "Characterizing Multispectral Vertical Profiles of Aerosol Extinction with Surface-based Measurements," 2018 Annual Directed Energy S&T Symposium, Oxnard, CA.
- Fiorino, S.T., K.J. Keefer, C.A. Rice, J.L. Burley, and J. Schmidt#, "Characterizing Multispectral Vertical Profiles of Aerosol Extinction with Surface-Based Measurements," 22nd Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface (IOAS-AOLS), 98th Annual American Meteorological Society Meeting, Austin, TX, Jan 2018. (<https://ams.confex.com/ams/98Annual/webprogram/Paper335342.html>).

SRITHARAN, SIVAGURU S.,

TERZUOLI, ANDREW J., Jr., Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

- Bertus Shelters, Brannon Elmore, James Ethridge, Jaclyn Schmidt, Jarred Burley, Steven Fiorino, Joseph Sugrue, Andrew Terzuoli, "Attenuation Statistics Derivation in the V&W Band Using Weather Cubes," Proceedings of the 2018 IEEE Symposium on Antennas and Propagation and USNC/URSI Radio Science Meeting (APS/URSI), Boston, MA, 8-13 July 2018.

Bertus Shelters, Brannon Elmore, James Ethridge, Jaclyn Schmidt, Jarred Burley, Steven Fiorino, Joseph Sugrue, Andrew Terzuoli, "Calculation of Long-Term Tropospheric Attenuation Statistics Using Weather Cubes." Proceedings of the 2018 IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2018), Valencia, SP, 22-27 July 2018

WEEKS, DAVID E., Department of Engineering Physics

SPONSOR FUNDED RESEARCH

"Theoretical Models of Novel Glass Fiber Lasers." Sponsor: AFRL/RD. Funding: \$40,000.

6.4. CENTER FOR OPERATIONAL ANALYSIS

Center for Operational Analysis (COA)

Director (937) 255-3636 x4251

Deputy Director (937) 255-3636 x4523

Homepage: <http://www.afit.edu/COA>

6.4.1. DOCTORAL DISSERTATIONS

LITTLE, ZACHARY C., Experimental Designs, Meta-modeling, and Meta-learning for Mixed-Factor Systems with Large Decision Spaces. AFIT/ENS/DS/18M-137. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AFLCMC.

RANLY, NEIL C., Methods to Support the Project Selection Problem with Non-Linear Portfolio Objectives, Time Sensitive Objectives, Time Sensitive Resource Constraints, and Modeling Inadequacies. AFIT/ENS/DS/18S-040. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AFMC.

WEIMER, CHRISTOPHER W., Generating Strong Diversity of Opinions: Agent Models of Continuous Opinion Dynamics. AFIT/ENS/DS/18S-044. Faculty Advisor: Dr. John O. Miller. Sponsor: 711 HPW/RH.

6.4.2. MASTER'S THESES

BIHANSKY, THOMAS S., Resilient Aircraft Maintenance Constructs: Enhancing Repair Network Designs to Effectively Manage Risks and Supply Chain Disruptions. AFIT/ENS/MS/18M-104. Faculty Advisor: Dr. Daniel W. Steeneck. Sponsor: N/A.

BOHALL, DUSTIN D., A Study of the F-35 Sustainment Strategy: Fiscal Implications of Participant Secession. AFIT/ENS/MS/18M-108. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AF F-35A IO.

BUTT, SPENCER A., Cyber Data Anomaly Detection Using Autoencoder Neural Networks. AFIT/ENS/MS/18M-113. Faculty Advisor: Dr. Bradley C. Boehmke. Sponsor: ARCYBER.

FINNEY, DANIEL S., Aircraft Availability: Maintenance Inputs and Acquisition Decisions. AFIT/ENS/MS/18M-120. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: AFMC.

FROOM, CHELSEA T., Liner Workload Forecasting Augmented by Non-Traditional Data Sources. AFIT/ENS/MS/18M-121. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: USTRANSCOM.

FURRER, SARAH K., Simulating B-2 Heavy Maintenance Policies Driven by Low Observable Maintenance Management to Determine Future Fleet Health. AFIT/ENS/MS/18M-122. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AFLCMC.

GALLAGHER, JAMES C., Market Basket Analysis with Shortened Web Link Click Data. AFIT/ENS/MS/18M-123. Faculty Advisor: LTC Christopher M. Smith. Sponsor: ARCYBER.

HOLLIGER, THEODORE S., Strategic Sourcing Via Category Management: Helping Air Force Installation Contracting Agency Eat One Piece of the Elephant. AFIT/ENS/MS/18M-128. Faculty Advisor: Dr. Bradley C. Boehmke. Sponsor: AFICA.

KUBALEK, SCOTT M., Finding an Optimal Theater Ammunition Distribution Strategy for United States Air Force in Europe. AFIT/ENS/MS/18M-132. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: USAFE.

LANKOW, ANDREW J., A Surprising Symbiosis: Examining the Mutualism in Department of Defense Conservation Partnerships. AFIT/ENS/MS/18M-134. Faculty Advisor: Capt Benjamin T. Hazen. Sponsor: N/A.

MACIAS, MIGUEL J., Scheduling Tool for the Nevada Test and Training Range. AFIT/ENS/MS/18M-138. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: 57 OSS.

MCCLURE, GORDON M., Schedule Optimization and Simulation for the F-16 Service Life Extension Program. AFIT/ENS/MS/18S-036. Faculty Advisor: Dr. John O. Miller. Sponsor: AFSC.

MCEVOY, LINDSEY N., A Study of Military Health Care Costs: Direct Versus Purchased Care in a Geographical Region. AFIT/ENS/MS/18M-143. Faculty Advisor: Maj Heidi Tucholski. Sponsor: AFMOA.

MERT, HUSEYIN., Flightline Simulation Modeling of a Squadron. AFIT/ENS/MS/18S-038. Faculty Advisor: Dr. John O. Miller. Sponsor: TuAF.

MESSER, BRETT J., DoD Resource Sharing: USAFRICOM & USEUCOM Forces. AFIT/ENS/MS/18S-039. Faculty Advisor: Capt Benjamin T. Hazen. Sponsor: N/A.

MUNSON, EVAN L., Sentiment Analysis of Twitter Data. AFIT/ENS/MS/18M-148. Faculty Advisor: LTC Christopher M. Smith. Sponsor: N/A.

NOBLE, CLIFTON M., Simulating Aircraft Availability in a Combat Environment Considering Logistics. AFIT/ENS/MS/18M-150. Faculty Advisor: Dr. John O. Miller. Sponsor: AFMC.

PRATT, JOSIAH J., Higher Order Effects of Fielding the New ICBM Gas Transfer System. AFIT/ENS/MS/18M-154. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AFGSC.

SCHOENBECK, JOSEPH E., The Developmental Test Scheduling Problem. AFIT/ENS/MS/18M-160. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: N/A.

SEVIER, WILLIAM C., Text Classification of Installation Support Contract Topic Models for Category Management. AFIT/ENS/MS/18M-161. Faculty Advisor: Dr. Bradley C. Boehmke. Sponsor: AFICA.

SMALL, MATTHEW T., Predicting Global Disposition of US Military Personnel via Open-Source, Unclassified Means. AFIT/ENS/MS/18M-162. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: USTRANSCOM.

SMITH, JEFFREY R., The Application of Text Mining and Data Visualization Techniques to Textual Corpus Exploration. AFIT/ENS/MS/18M-163. Faculty Advisor: LTC Christopher M. Smith. Sponsor: N/A.

TRIGO, ALEXANDER M., Outlier Classification Criterion for Multivariate Cyber Anomaly Detection. AFIT/ENS/MS/18M-166. Faculty Advisor: Dr. Bradley C. Boehmke. Sponsor: ASC.

6.4.3. GRADUATE RESEARCH PAPERS

CANNONE, ANTHONY J., Executive Airlift Fleet Size after C-20 Retirement. AFIT/ENS/MS/18J-015. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: N/A.

CARLSON, MICHAEL M., A Multi Criteria Decision Making Model for Air Force Enterprise Information Technology Sourcing Decisions. AFIT/ENS/MS/18J-016. Faculty Advisor: Capt Benjamin T. Hazen. Sponsor: SAF.

LAD, NIRAV D., Utilizing Sources Of Airlift Channel Variability To Predict Time Definite Delivery. AFIT/ENS/MS/18J-034. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AMC.

MCGUIRE, DANIEL P., Forecasting the Future of Logistics: The Formulation of an Internet of Things Capability Index. AFIT/ENS/MS/18J-040. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: HQ USAF/A4.

MODAD, ROBBY J., ICBM Technologies to Counter Adversary Nuclear Threats. AFIT/ENS/MS/18J-043. Faculty Advisor: Capt Benjamin T. Hazen. Sponsor: N/A.

6.4.4. FACULTY RESEARCH OUTPUT

Notes: Faculty Bios can be found under their respective department listings. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

BOEHMKE, BRADLEY C., Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

“Implications of Intellectual Property and Data Rights on Technology Transfer and Small Business Success.” Sponsor: AFRL/SB. Funding: \$200,000 – Boehmke 50%, Hartman 25%, Weir 25%.

BORGHETTI, BRETT J., Department of Electrical and Computer Engineering

CUNNINGHAM, WILLIAM A., Department of Operational Sciences

HAZEN, BENJAMIN, T., Department of Operational Sciences

REFEREED JOURNAL PUBLICATIONS

Wang, Y., Hazen, B. T., & Mollenkopf, D. A., “Consumer value considerations and adoption of remanufactured products in closed-loop supply chains,” *Industrial Management and Data Systems*, Vol. 118, No. 2, pp. 480-498, 2018.

Wang, Y., Huscroft, J., Hazen, B. T., & Zhang, M., “Green information, green certification, and consumer perceptions of remanufactured automobile parts,” *Resources, Conservation & Recycling*, Vol. 128, pp. 187-196, 2018.

Zhu, S., Song, J. C., Hazen, B. T., Kang, L., & Cegielski, C., “How supply chain analytics enables operational supply chain transparency: An information processing theory perspective,” *International Journal of Physical Distribution & Logistics Management*, Vol. 48, No. 1, pp. 47-68, 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Stanton, D.J, Hazen, B.T., & Breitbach, T.W., “Blockchain for supply chain management simulation.” 2018 Council of Supply Chain Management Academic Research Symposium, Nashville, TN, 30 Sep – 3 Oct 2018.

Zacharia, Z. G., Hazen, B.T., Breitbach, T.W., & Mir, S., “Deriving value from and managing customer driven coopetition projects” 2018 Council of Supply Chain Management Academic Research Symposium, Nashville, TN, 30 Sep – 3 Oct 2018.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Co-Editor, Journal of Defense Analytics and Logistics

Senior Associate Editor, International Journal of Logistics Management

Senior Associate Editor, International journal of Physical Distribution & Logistics Management

Associate Editor, Global Journal of Flexible Systems Management

Guest Editor, International Journal of Logistics: Research & Applications

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Mishra, D., Luo, Z., & Hazen, B. T., “The role of informational and human resource capabilities for enabling diffusion of big data and predictive analytics and ensuing performance,” *In Innovation and Supply Chain Management - Relationship, Collaboration and Strategies*, pp. 283-302, 2018.

MILLER, JOHN O., Department of Operational Sciences

JOHNSON, ALAN W., Department of Operational Sciences

SMITH, CHRISTOHER M., LTC, Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

“Africa Logistics Network (ALN).” Sponsor: USAFRICOM. Funding: \$54,600 – Smith 34%, Breitbach 33%, Steeneck 33%.

“Women and Stability in Western Africa.” Sponsor: USAFRICOM. Funding: \$4,725 – Smith 50%, Breitbach 50%.

STEENECK, DANIEL W., Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

“Hyperparameter Estimation for Neural Networks Applied to Automatic Target Recognition.” Sponsor: AFRL/RX. Funding: \$50,000 – Steeneck 50%, Jordan 50%.

TUCHOLSKI, HEIDI M., Maj, Department of Operational Sciences

WEIR, JEFFERY D., Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

“Design of Experiment (DOE) and Meta-modelling support for the ISR Collect and Defeat of Agile and Intelligent Targets (DAIT) programs at the Simulation and Analysis Facility (SIMAF).” Sponsor: AFLCMC. Funding: \$150,000.

“AFIMSC, RMO Analysis Support.” Sponsor: AFIMSC. Funding: \$450,000.

“Air Force Inspection Agency (AFIA) Support for UEI Generator.” Sponsor: AFIA. Funding: \$34,000.

“Value-Driven Tradespace Exploration and Analysis for Resilient Systems.” Sponsor: USA ERDC. Funding: \$100,000.

“Strategic Development Planning & Experimentation Support: Roadmap for Multi-Domain Modeling, Simulation, Analysis and Experimentation.” Sponsor: SDPE. Funding: \$700,000.

“Joint Service Explosive Ordnance Disposal (EOD) Technology Capability Based Value Model (CBVM) Support.” Sponsor: NSWC. Funding: \$200,000.

“Air Force Institute of Technology Center for Operational Analysis (AFIT/COA) Support to Acquisition Intelligence Requirements Task Force (AIRTF) for Intelligence Mission Data (IMD) Cost, Capability Analysis (CCA) (Revised).” Sponsor: OSD. Funding: \$537,047.

“Design of Experiment (DOE) and Meta-modelling support for the ISR Decision Support at the Simulation and Analysis Facility (SIMAF).” Sponsor: AFLCMC. Funding: \$50,000.

“AFRL/RX Analytics Implementation and Demonstration.” Sponsor: AFRL/RX. Funding: \$40,000.

“Sliding Scale Autonomy through Physiological Rhythm Evaluations (SAPHYRE).” Sponsor: OFRN (WSU).
Funding: \$109,993.

6.5. CENTER FOR SPACE RESEARCH AND ASSURANCE

Center for Space Research and Assurance (CSRA)

Director (937) 255-3636 x4679
Deputy Director (937) 255-3636 x4285
Associate Director (937) 255-3636 x4559
Homepage: <http://www.afit.edu/CSRA>

6.5.1. DOCTORAL DISSERTATIONS

CURTIS, DAVID H., Satellite Articulation Sensing using Computer Vision. AFIT/ENY/DS/18S-060. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A.

PRINCE, ERIC R., Optimal Finite Thrust Guidance Methods for Constrained Satellite Proximity Operations Inspection Maneuvers. AFIT/ENY/DS/18S-071. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A.

6.5.2. MASTER THESES

BASRAOUI, WALID., Analysis of Merit-Based Observation Scheduling for Geosynchronous Earth Orbit Space Situational Awareness. AFIT/ENV/MS/18M-175. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A.

BATEMAN, MARK G., Optimization of Geosynchronous Earth Orbit and Ascent Vehicle Space Situational Awareness Via Parallel Evaluation of Executable Architectures. AFIT/ENV/MS/18M-176. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A.

BUEHLER, DAVID J., Utilizing Supercomputing to Analyze Risks of An Emergent Large-Scale Debris Field in Low Earth Orbit. AFIT/ENV/MS/18M-184. Faculty Advisor: Col Dane F. Fuller. Sponsor: N/A.

CERRI, JOSHUA T., Thermal Testing of Fused Deposition Modeling Extended to an Orbital Environment. AFIT/ENY/MS/18S-058. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: N/A.

CIPERA, DANIEL L., Comparison of Traditional Versus CubeSat Remote Sensing: A Model-Based Systems Engineering Approach. AFIT/ENV/MS/18M-187. Faculty Advisor: Dr. David R. Jacques. Sponsor: N/A.

DAHLKE, JACOB A., Optimal Trajectory Generation in a Dynamic Multi-Body Environment using a Pseudospectral Method. AFIT/ENY/MS/18M-248. Faculty Advisor: Capt Joshua A. Hess. Sponsor: N/A.

DUANE, MARK C., Constellation Design for SSA of a Direct Ascent Servicing Mission to the Geosynchronous Belt. AFIT/ENY/MS/18M-253. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A.

FAY, THOMAS J., Contextual Maneuver Estimation for Non-Cooperative Satellites in Proximity Operations. AFIT/ENY/MS/18S-064. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A.

FELTEN, MICHAEL S., Optimization of Geosynchronous Space Situational Awareness Architectures using Parallel Computation. AFIT/ENV/MS/18M-202. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A.

HILL, DANIEL E., Lightning Prediction Using Artificial Neural Networks and Electric Field Mill Data. AFIT/ENC/MS/18M-002. Faculty Advisor: Lt Col Richard S. Seymour. Sponsor: 45 WS.

HOFFMAN, JEREMIAH R., Passive Load Testing for Evaluation of Electromechanical Actuators. AFIT/ENY/MS/18M-263. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFRL/RQ.

HUDSON, KEITH A., Application of Automated Balancing Methods for an Attitude Control Test Platform with Non-Orthogonal Masses. AFIT/ENY/MS/18J-076. Faculty Advisor: Capt Andrew J. Lingenfelter. Sponsor: AFRL/RV.

KATZOVITZ, JUSTIN D., Space-based Maneuver Detection and Characterization using Multiple Model Adaptive Estimation. AFIT/ENY/MS/18M-268. Faculty Advisor: Capt Joshua A. Hess. Sponsor: N/A.

KOO, TAEHOI ., Architecting a reconnaissance satellite constellation for the Korean Peninsula. AFIT/ENY/MS/18M-270. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A.

LARUE, ROBERT B., Algorithms for Small Satellite Formation Flying. AFIT/ENY/MS/18M-273. Faculty Advisor: Lt Col Kirk W. Johnson. Sponsor: AFRL/RV.

LEE, LAWRENCE J., Bandwidth Analysis of a Tightly-Packed Crossed-Dipole Array for Satellite Communications. AFIT/ENG/MS/18M-041. Faculty Advisor: Dr. Andrew J. Terzuoli. Sponsor: AFOSR.

LIU, KAN B., Design and Evaluation of an Additively Manufactured Lattice Optimized Actively Cooled Nose Cone. AFIT/ENY/MS/18M-275. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFRL/RV.

MCCREA, JOHN P., Design of a Zero-Gravity, Vacuum-Based 3D Printer Robot for In-Space Satellite Assembly. AFIT/ENV/MS/18M-221. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: N/A.

MOORE, TYLER M., Special Perturbations on the Jetson TX1 and TX2 Computers. AFIT/ENG/MS/18M-047. Faculty Advisor: Col Dane F. Fuller. Sponsor: N/A.

NACITA, ISAAC M., Modeling and Test Results of a CubeSat Shape Memory Alloy Helical Antenna Array. AFIT/ENY/MS/18M-281. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A.

OCAMPO, RODRIGO I., CubeSat Deployable Solar Panel Hinge Using Nitinol Smart Memory Alloy. AFIT/ENY/MS/18M-282. Faculty Advisor: Maj Ryan P. O'Hara. Sponsor: N/A.

RAMOS, VON DRAKE L., Vulnerability Assessment of the Smallest Agile Transmit Receive Network (SATRN) Software Suite. AFIT/ENY/MS/18M-288. Faculty Advisor: Dr. Robert F. Mills. Sponsor: N/A.

ROBERTS, KARSON A., Design and Testing of an Additively Manufactured CubeSat Structural Bus. AFIT/ENY/MS/18M-289. Faculty Advisor: Maj Ryan P. O'Hara. Sponsor: N/A.

ROCKER, CHRISTOPHER C., The Study and Application of Carbon Nanotube Film Heaters for Space Applications. AFIT/ENY/MS/18M-290. Faculty Advisor: Maj Ryan P. O'Hara. Sponsor: N/A.

SARGEANT, BENJAMIN N., Modeling and Analysis of Quantum Key Distribution Satellite Constellations. AFIT/ENY/MS/18M-292. Faculty Advisor: Lt Col Logan O. Mailloux. Sponsor: NASIC.

SHEETS, BRAEDEN A., Pseudo Linear Hall Effect Thruster Characterization through Potential, Magnetic, and Optical Measurements. AFIT/ENY/MS/18M-293. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFOSR.

SHELTERS, BERTUS A., Satellite Communications in the V and W Band: Tropospheric Effects. AFIT/ENG/MS/18M-060. Faculty Advisor: Dr. Andrew J. Terzuoli. Sponsor: AFRL/RI.

SPENDEL, DAVID F., Parameter Study of an Orbital Debris Defender Using Two Team, Three Player Differential Game Theory. AFIT/ENY/MS/18M-295. Faculty Advisor: Capt Joshua A. Hess. Sponsor: N/A.

TOMLIN, DESTINY B., Creation and Presentation of a Systems-Level Model for an AF-M315E Monopropellant Micro-Thruster. AFIT/ENY/MS/18S-075. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: N/A.

VANZANDT, PERRY K., Geosynchronous Belt Proximity Operations Mission Planner. AFIT/ENY/MS/18M-300. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: NASIC.

WATERS, MICHAEL C., Analysis of Additively Manufactured Injectors for Rotating Detonation Engines. AFIT/ENY/MS/18M-301. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFRL/RQ.

WERNER, CALEB J., Military Utility Analysis of RF Geolocation via Quadrifilar Antennas Onboard a CubeSat. AFIT/ENY/MS/18M-302. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A.

WHITMAN, JOSEPH R., Application of Spectral Solution and Neural Network Techniques in Plasma Modeling for Electric Propulsion. AFIT/ENY/MS/18S-076. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFRL/RQ.

WRIGHT, SAMUEL D., Characterization and Analysis of Plasma Instabilities in a 600W Permanent Magnet Hall Thruster. AFIT/ENY/MS/18M-308. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFOSR

6.5.3. FACULTY RESEARCH OUTPUT

Notes: Faculty Bios can be found under their respective department listings. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

ALBRECHT, TIMOTHY W., Col, Department of Operational Sciences

AYRES, BRADLEY J., Department of Aeronautics and Astronautics

BETANCES, JOAN A., Maj, Department of Electrical and Computer Engineering

BETTINGER, ROBERT A., Maj, Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

“Aerospace Control, Estimation, and Stochastics (ACES) I Short Course.” Sponsor: NASIC. Funding: \$20,000 – Bettinger 20%, Cobb 20%, Hartsfield 20%, Johnson 20%. [CSRA]

CARBINO, TIMOTHY J., Maj, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Exploration of Estimative Algorithms for Improved Handling of Single Event Upsets.” Sponsor: Undisclosed. Funding: \$54,936 – Carbino 75%, Petrosky 25%.

COBB, RICHARD G., Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

“Optimization and Computer Vision for Proximity Operations.” Sponsor: Undisclosed. Funding: \$35,000.

“Space Domain Modeling & Simulation via High Performance Computing.” Sponsor: Undisclosed. Funding: \$200,000 – Cobb 50%, Meyer 50%.

“AFIR Support for the Orbital Engagement Maneuver (OEM) Integrated Validation Team (IVT).” Sponsor: AFSPC. Funding: \$100,000 – Cobb 25%, Hess 25%, Johnson 25%, Meyer 25%.

“Optimization and Decision Support for TMAP.” Sponsor: NASIC. Funding: \$35,000.

“Daytime Imaging for Persistent Space Situational Awareness.” Sponsor: AFRL/RV. Funding: \$50,000.

REFEREED JOURNAL PUBLICATIONS

Prince, E. and Cobb, R., “Optimal Inspector Satellite Guidance to Quasi-Hover via Relative Teardrop Trajectories,” *Acta Astronautica*, February 15, 2018, <https://doi.org/10.1016/j.actaastro.2018.02.017>

Sargeant, B.N., Mailloux, L.O. and Cobb, R.G., “Analysis of Quantum Key Distribution Satellite Constellations,” *Journal of Defense Research & Engineering*, Vol 1, Issue 2, August 2018. AD1058504

Curtis, D and Cobb, R., “Noncooperative Satellite Articulation Characterization and Tracking with Computer Vision,” *Journal of Defense Research & Engineering*, Vol 1, Issue 2, August 2018. AD1058499

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Curtis, D, and Cobb, R., “Illumination effects on satellite articulation characterization from a trajectory matrix using optimization”, IEEE Aerospace Conference, Big Sky MT, 3-10 March 2018

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Stern, J., Wachtel, S., Colombi, J., Meyer D. and Cobb, R. (2018), “Multi-objective Optimization of Geosynchronous Earth Orbit Space Situational Awareness Systems via Parallel Executable Architectures”, 2017 Disciplinary Convergence in Systems Engineering Research. Springer, Cham, https://doi.org/10.1007/978-3-319-62217-0_42

Curtis, D and Cobb, R., “Satellite Articulation Tracking Using Monocular Computer Vision” AAS 41st Annual Guidance and Control Conference, (AAS 18-097) Breckenridge CO, 5-9 Feb 2018

Prince, E. and Cobb, R., "Optimal Guidance for Relative Teardrops with Lighting and Collision Constraints", AIAA Guidance, Navigation, and Control Conference, AIAA SciTech Forum, 8-12 January 2018, Kissimmee FL, (AIAA 2018-0867) <https://doi.org/10.2514/6.2018-0867>

COLLINS, PETER J., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Noise Radar CubeSat Design and Engineering Model.” Sponsor: Undisclosed. Funding: \$150,000 – Collins 30%, Johnson 10%, Hartsfield 20%, Cobb 10%.

COLOMBI, JOHN M., Department of Systems Engineering and Management

REFEREED JOURNAL PUBLICATIONS

Stern, J., Wachtel, S., **Colombi**, J., Meyer, D. and R. Cobb. (2018). Multiobjective Parallel Optimization of Geosynchronous Space Situational Awareness Architectures. *AIAA Journal of Spacecraft and Rockets*. <https://arc.aiaa.org/doi/abs/10.2514/1.A34043>

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Michael S. Felten, John M. **Colombi**, Richard G. Cobb and David W. Meyer, Optimization of Geosynchronous Space Situational Awareness Architectures Using Parallel Computation, Advanced Maui Optical and Space Surveillance Technologies (AMOS) Conference, Maui, HI, Sep 2018.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Michael S. Felten*, John M. **Colombi**, Richard G. Cobb, David W. Meyer, Multi-objective optimization using parallel simulation for space situational awareness, *Journal of Defense Modeling and Simulation (Accepted/ with Revisions, May 2018)*

CORBELL, PHILLIP M., Lt Col, Department of Electrical and Computer Engineering

COX, BRUCE A., Lt Col, Department of Operational Sciences

DECKRO, RICHARD F., Department of Operational Sciences

EMMONS, DANIEL J, Maj, Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“Using GPS Radio Occultation Data to Monitor Sporadic-E.” Sponsor: AFRL/RV. Funding: \$18,000.

FERDINANDUS, MANUEL R., Maj, Department of Engineering Physics

FIORINO, STEVEN T., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

Thomas, G., R. Cobb, S.T. Fiorino, and M. Hawks, “Daytime Sky Radiance Model Validation of GEO-belt in NIR-SWIR,” 2018 Atmospheric Transmission Models-Modeling in Remote Sensing Meeting, Newton, MA, 5 June 2018.

FULLER, DANE F., Col, School of Engineering and Management

SPONSOR FUNDED RESEARCH PROJECTS

“Program Analyst for Integrated Air and Missile Defense.” Sponsor: MDA. Funding: \$77,797.

“GEO SSA Architecture Study.” Sponsor: AFRL/RV. Funding: \$50,000 – Fuller 20%, Bettinger 20%, Hartsfield 40%, Cobb 20%.

“Jetson TX2 PC104 Board.” Sponsor: Undisclosed. Funding: \$110,098 – Fuller 40%, Hartsfield 30%, Cobb 30%.

“EO-IR Satellite Study.” Sponsor: Undisclosed. Funding: \$50,000 – Fuller 20%, Bettinger 20%, Hartsfield 40%, Cobb 20%.

“Grissom 6U Bus with Beacon.” Sponsor: Undisclosed. Funding: \$50,000 – Fuller 25%, Johnson 25%, Cobb 25%, Hartsfield 25%.

GROSS, KEVIN C., Department of Engineering Physics

GUNAWARDENA, SANJEEV, Department of Electrical and Computer Engineering

HARTSFIELD, CARL R., Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

“Design for Satellite Structures Built In Space.” Sponsor: Undisclosed. Funding: \$89,375 – Hartsfield 50%, O'Hara 50%.

“Accion Thruster Evaluation.” Sponsor: Undisclosed. Funding: \$83,750.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Wright, S.D., and Hartsfield, C.R., “Characterization and Analysis of Anomalous Diffusion Modes in a 600W Permanent Magnet Hall Thruster”, AIAA-2018-1504, 56th AIAA Aerospace Sciences Meeting, 10 January 2018.

Sheets, B., and Hartsfield, C.R., “Pseudo Linear Hall Effect Thruster Characterization through Potential, Magnetic, and Optical Measurements”, AIAA-2018-2198, 56th AIAA Aerospace Sciences Meeting, 12 January 2018.

McCrea, J., Cerri, J.T., and Hartsfield, C.R., “Design of a Zero-Gravity, Vacuum-Based 3D Printer Robot for Use of In-Space Satellite Assembly”, AIAA-2018-2201, 56th AIAA Aerospace Sciences Meeting, 12 January 2018.

HAWKS, MICHAEL R., Department of Engineering Physics

HESS, JOSHUAH, A., Capt, Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

“Pursuit-Evasion Differential Games for Relative Satellite Motion with Incomplete Information.” Sponsor: AFRL/RV. Funding: \$12,500.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Prince, E. R., Hess, J.A., Carr, R.W., Cobb, R.G., “Elliptical Orbit Proximity Operations Differential Games”, 2018 AAS/AIAA Astrodynamics Specialist Conference (AAS 18-462)

HODSON, DOUGLAS D., Department of Electrical and Computer Engineering

HOGSED, MICHAEL R., Lt Col, Department of Engineering Physics

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

“Total ionizing dose effects in NVIDIA Jetson TX2I modules,” AFIT/ENP, 10 Sep 2018.

HOPKINSON, KENNETH M., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Sensor Data Fusion for Improved Target Detection.” Sponsor: AFRL/RV. Funding: \$22,000 – Hopkinson 50%, Steward 50%.

JACQUES, DAVID R., Department of Systems Engineering and Management

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Cipera, D., D. Jacques and T. Ford, “Comparison of Traditional Versus Cubesat Remote Sensing: A Model-Based System Engineering Approach”, *Conference on Systems Engineering Research*, Charlottesville, VA, May 2018.

JOHNSON, KIRK W., Lt Col, Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

“Propellantless Satellite Formation Control for LCE (Laser Crosslink Experiment).” Sponsor: SPAWAR. Funding: \$24,000.

“Grissom 6U CubeSat Bus.” Sponsor: AFRL/RV. Funding: \$96,300.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

LaRue, R.B., and Johnson, K.W., "Reconfiguration of Small-Satellite General Circular Orbit Formations," AIAA 2018-2219, AIAA SciTech Forum, Orlando, Florida, January 2018.

LaRue, R.B., and Johnson, K.W., "Algorithms for Small Satellite Formation Initialization," American Astronautical Society Paper 18-231, presented at the AAS/AIAA Astrodynamics Specialist Conference, Snowbird, UT, August 2018.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

LaRue, R.B., and Johnson, K.W., "Algorithms for Small Satellite Formation Flying," Dayton-Cincinnati Aerospace Sciences Symposium, February 2018.

KOMIVES, JEFFREY R., Maj, Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

"Verification and Validation of Signature Codes for Hypersonic Modeling." Sponsor: AFRL/RV. Funding: \$26,300.

LAKE, ROBERT A. Capt, Department of Electrical and Computer Engineering

LAURVICK, TOD V. Maj, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

"Fission Induced Neutron Detection of Nuclear Materials (FIND'NM)." Sponsor: Undisclosed. Funding: \$290,000 – Laurvick 30%, Petrosky 40%, Hogsed 15%, Cobb 15%.

REFEREED JOURNAL PUBLICATIONS

J.M. Sattler, R.A. Coutu, R. Lake, T. Laurvick, T. Back, S. Fairchild, "Modeling micro-porous surfaces for secondary electron emission control to suppress multipactor," Journal of Applied Physics, Vol 122, Issue 5, 2017

LINGENFELTER, ANDREW J., Maj, Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

"Vacuum Casting of Spacecraft Structure." Sponsor: Undisclosed. Funding: \$37,564 – Lingenfelter 34%, Hartsfield 33%, Hess 33%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Cobb, G., Lingenfelter, A., Nesmith, A., and O'Hara, R., "Vibrational Properties of Additively Manufactured Inconel 718", 56th AIAA Aerospace Sciences Meeting, AIAA 2018-0489, 2018.

LOPER, ROBERT D., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

"Heavy Ion to Proton Fluence Ratios in Solar Energetic Particle Events and Effects on Spacecraft Anomalies." Sponsor: AFRL/RV. Funding: \$18,000.

MAILLOUX, LOGAN O., Lt Col, Department of Systems Engineering and Management

SPONSOR FUNDED RESEARCH PROJECTS

“Model and Analyze Space Systems Security Design, Architecture, and Resiliency Criteria.” Sponsor: AFRL/RV. Funding: \$62,500.

MARCINIAK, MICHAEL A., Department of Engineering Physics

MCCLORY, JOHN W., Department of Engineering Physics

MERKLE, LAURENCE D., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Autonomous Correlation of Ground-Based EO Tracks of GEO RSOs.” Sponsor: AFRL/RV. Funding: \$10,000.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

W. McQuaid, J. Fletcher, L. D. Merkle, R. Cobb, and B. Borghetti. Autonomous Correlation of Ground-Based Non-Resolved GEO RSO Tracks using Deep Neural Networks. 19th Annual Advanced Maui Optical and Space Surveillance Technologies Conference, Wailea, HI, 13 Sep 18.

NAVA, OMAR A., Maj, Department of Engineering Physics

O’HARA, RYAN P., Maj, Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

“Optimized, Integrated, and Additively Manufactured CubeSat Structural Bus.” Sponsor: Undisclosed. Funding: \$81,875 – O’Hara 50%, Hartsfield 50%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Cobb, G., Lingenfelter, A., Nesmith, A., and O’Hara, R., “Vibrational Properties of Additively Manufactured Inconel 718”, 56th AIAA Aerospace Sciences Meeting, AIAA 2018-0489, 2018.

PETROSKY, JAMES C., Department of Engineering Physics

REFEREED JOURNAL PUBLICATIONS

Christina L Dugan, George Glenn Peterson, Alyssa Mock, Christopher Young, J Matthew Mann, Michael Nastasi, Mathias Schubert, Lu Wang, Wai-Ning Mei, Iori Tanabe, Peter A Dowben, James Petrosky, “Electrical and material properties of hydrothermally grown single crystal (111) UO₂,” The European Physical Journal B, April, 2018

RUTLEDGE, JAMES L., Lt Col, Department of Aeronautics and Astronautics

STEWART, BRYAN J., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“Sensor Data Fusion for Improved Target Detection Location (Continuation).” Sponsor: AFRL/RV. Funding: \$40,500.

TEMPLE, MICHAEL A., Department of Electrical and Computer Engineering

TERZUOLI, ANDREW J., Jr., Department of Electrical and Computer Engineering

WIESEL, WILLIAM E., Jr., Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

“AFIT Orbit Determination Algorithms for Modeling, Simulation and Analysis with HPC.” Sponsor: AFRL/RV.
Funding: \$37,500.

REFEREED JOURNAL PUBLICATIONS

W. E. Wiesel, “A KAM Tori Algorithm for Earth Satellite Orbits”, *Journal of the Astronautical Sciences*, v. 65, pp 46–62, 2018. <https://doi.org/10.1007/s40295-017-0123-7>.

Rich, A.T., Stuart, K.J., and Wiesel, W.E., “Stochastic Dynamics of and Collision Prediction for Low Altitude Earth Satellites”, *Journal of the Astronautical Sciences*, <https://doi.org/10.1007/s40295-018-0129-9>. Published Online 12 June 2018.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Wiesel, W.E., “Action-Angle Variables Near Degenerate Periodic Orbits”, AAS 18-205, Presented at the 2018 AAS/AIAA Astrodynamics Specialist Conference, Snowbird, UT. August 2018;

6.6. CENTER FOR TECHNICAL INTELLIGENCE STUDIES AND RESEARCH

Center for Technical Intelligence Studies and Research (CTISR)

Director (937) 255-3636 x4558

Homepage: <http://www.afit.edu/CTISR>

6.6.1. DOCTORAL DISSERTATIONS

LANE, CORY T., In-Scene Atmospheric Compensation of Thermal Hyperspectral Imaging with Applications to Simultaneous Shortwave Data Collection. AFIT/ENP/DS/17D-008. Faculty Advisor: Dr. Kevin C. Gross. Sponsor: NASIC.

PAULEC, MASON D., Reconstruction of the 3D Temperature and Species Concentration Spatial Distribution of a Jet Engine Exhaust Plume Using an Infrared Fourier Transform Spectrometer Hyperspectral Imager. AFIT/ENP/DS/18S-025. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: N/A.

SCHWAAB, MATTHEW J., Arrhenius Rate Chemistry Informed Inter-phase Source Terms (ARCIIST) for Macro-Scale Explosive Hydrocodes. AFIT/ENY/DS/18S-072. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: AFOSR.

SHEPHERD, JACK A., Evaluation and Quantification of Diffractive Plenoptic Camera Algorithm Performance. AFIT/ENP/DS/18S-026. Faculty Advisor: Lt Col Anthony L. Franz . Sponsor: AFOSR.

6.6.2. MASTER'S THESES

KERST, AMY M., Investigation of Scramjet Flowfield Temperatures at the Boundary Layer with Hyperspectral Imaging. AFIT/ENP/MS/18J-011. Faculty Advisor: Dr. Kevin C. Gross. Sponsor: AFOSR.

LOIBL, ROBERT P., Target Detection using Convolutional Neural Networks. AFIT/ENG/MS/18M-043. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RV.

MAYO-JOHNSON, JEREMY A., Validation of a Midwave Infrared Nighttime Cloud Mask. AFIT/ENP/MS/18M-089. Faculty Advisor: Lt Col Robert A. Stenger. Sponsor: N/A.

OREN, EVAN P., Three-Dimensional Wall Effects of a Scramjet Cavity Flameholder. AFIT/ENY/MS/18S-068. Faculty Advisor: Maj Jeffrey R. Komives. Sponsor: AFRL/RQ.

6.6.3. FACULTY RESEARCH OUTPUT

Notes: Faculty Bios can be found under their respective department listings. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

GROSS, KEVIN C., Department of Engineering Physics

REFEREED JOURNAL PUBLICATIONS

Jacob A. Martin, Kevin C. Gross, "Estimating Index of Refraction for Specular Reflectors Using Passive Polarimetric Hyperspectral (P-HSI) Radiance Measurements," *Optical Engineering*, Vol 56, No 8, 081812 (2017).
<https://doi.org/10.1117/1.OE.56.8.081812>

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Amy M. Kerst, Evan Oren, Jeffrey Komives, Kevin C. Gross. “Investigation of a Scramjet Flowfield with Hyperspectral Imaging Augmented by Large Eddy Simulation”, 18-AERO2018-Gross, Presented at the 53rd 3AF International Conference on Applied Aerodynamics, Salon de Provence, France, 26-28 March 2018.

HAWKS, MICHAEL R., Department of Engineering Physics

REFEREED JOURNAL PUBLICATIONS

A. Gavriales, L.A. Schlie, R.D. Loper, M.R. Hawks, G.P. Perram, “Analytic treatment of beam quality and power efficiency in high power transverse flow Diode Pumped Alkali Laser”, J. Opt. Soc. Am. B, **35**(9), 2202-2210 (2018).

HOPKINSON, KENNETH M., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Sensor Data Fusion for Improved Target Detection.” Sponsor: AFRL/RV. Funding: \$22,000 – Hopkinson 50%, Steward 50%.

JACKSON, JULIE A., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Dynamic Multi-static Radar Mission Planning.” Sponsor: AFRL/RV. Funding: \$50,000 – Jackson 50%, Lievsay 50%.

KOMIVES, JEFFREY R., Maj, Department of Aeronautics and Astronautics

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Gross, K., Komives, J.R., Kerst, A., and Oren, E. P., “Investigation of a Scramjet Flowfield with Hyperspectral Imaging Augmented by Large Eddy Simulation.” 53rd 3AF International Conference on Applied Aerodynamics, Salon-de-Provence, France, 2018.

LAURVICK, TOD V. Maj, Department of Eletrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Fission Induced Neutron Detection of Nuclear Materials (FIND'NM).” Sponsor: Undisclosed. Funding: \$290,000 – Laurvick 30%, Petrosky 40%, Hogsed 15%, Cobb 15%.

REFEREED JOURNAL PUBLICATIONS

J.M. Sattler, R.A. Coutu, R. Lake, T. Laurvick, T. Back, S. Fairchild, “Modeling micro-porous surfaces for secondary electron emission control to suppress multipactor,” Journal of Applied Physics, Vol.122, Issue 5, 2017.

MARCINIAK, MICHAEL A., Department of Engineering Physics

REFEREED JOURNAL PUBLICATIONS

“Tomographic reconstruction of a jet engine exhaust plume using an infrared hyperspectral imager,” M. Paulec, M. Marciniak, K. Gross, B. Akers and D. Azevedo, Optical Engineering 57(10), 103103(1-12) (Oct 2018).

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

“Infrared signature measurements of a jet turbine using a hyperspectral imager for combustion diagnostics,” M. Paulec, M.A. Marciniak, K. Gross, and D. Azevedo, Proc. SPIE **10644**, 10644-32 (2018).

SPONSOR FUNDED RESEARCH PROJECT

“Spectral, Polarimetric and Directionally Dependent Metrology of Infrared Metamaterials.” Sponsor: Undisclosed. Funding: \$62,150.

MERKLE, LAURENCE D., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Autonomous Correlation of Ground-Based EO Tracks of GEO RSOs.” Sponsor: AFRL/RV. Funding: \$10,000.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

W. McQuaid, J. Fletcher, L. D. Merkle, R. Cobb, and B. Borghetti. Autonomous Correlation of Ground-Based Non-Resolved GEO RSO Tracks using Deep Neural Networks. 19th Annual Advanced Maui Optical and Space Surveillance Technologies Conference, Wailea, HI, 13 Sep 18.

PERRAM, GLEN P., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“Digital Holography: Recording Geometry.” Sponsor: Undisclosed. Funding: \$82,077 – Perram 50%, Rice 50%.

OXLEY, MARK E., Department of Mathematics and Statistics

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Harrell, W., Petrosky, J., Oxley, M., and Gross, K., Demonstration of a Decision Making Algorithm for Optical Nuclear Detonation Monitoring, 2017 Military Sensing Symposia, National Symposium on Sensor and Data Fusion Proceedings, Nov 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Harrell, W., Petrosky, J., Oxley, M., and Gross, K., Optimization of Optical Nuclear Detonation Monitoring via Data Fusion, 2018 HEART, (classified SECRET), Apr 2018.

RICE, CHRISTOPHER A., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“The Enhanced Navy Simulation of the Extended MBL Environment (ENSEMBLE) Toolkit – Phase I Support to Spectral Sciences, Inc.” Sponsor: Navy STTR (Spectral Sciences). Funding: \$67,500.

STEWART, BRYAN J., Department of Engineering Physics

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

M. J. Schwaab, R. Greendyke, and B. J. Stewart. “Comparison of Burn Rate Models to Reaching Chemistry Model for HMX,” The American Society of Mechanical Engineers International Mechanical Engineering Congress, Phoenix, AZ (15 Nov 2017).

SPONSOR FUNDED RESEARCH PROJECTS

“Support to TAP Lab Effort (STAPLES).” Sponsor: SMC. Funding: \$325,000 – Steward 90%, Gross 10%.

“Persistent Infrared Scientific and Analytical Support.” Sponsor: NASIC. Funding: \$350,000 – Steward 90%, Gross 10%.

“Persistent Infrared Scientific and Analytical Support (Amendment).” Sponsor: NASIC. Funding: \$150,000 – Steward 10%, Gross 10%, Borghetti 80%.

7. TECHNOLOGY TRANSFER

7.1. COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENTS

"NDA - Advanced Turbine Cooling," USAF CRADA No. 18-AFIT-01, Collaborator: Honeywell International, Inc., Faculty Investigator: Dr. Marc Polanka. Effective Date: 9 November 2017, Term: 24 months.

"Longitudinal assessment of the influence of lifestyle homogenization on the MoBE in a cohort of United States Air Force Cadets," USAF CRADA No. 18-AFIT-02, Collaborator: University of Colorado-Boulder, Faculty Investigator: Lt Col Andrew Hoisington. Effective Date: 21 November 2017, Term: 24 months.

"Evaluation of Magnetic Sensing for Anomaly Map Navigation," USAF CRADA No. 18-AFIT-03, Collaborator: Honeywell Aerospace - Advanced Technology, Faculty Investigator: Capt Aaron Canciani. Effective Date: 27 December 2017, Term: 24 months.

"NDA - KubOS Flight Software and Major Tom Mission Control Software," USAF CRADA No. 18-AFIT-04, Collaborator: Kubos Corporation, Faculty Investigator: Col Dane Fuller. Effective Date: 21 November 2017, Term: 12 months.

"Inducing Known, Controlled Flaws in Electron Beam Wire Fed Additive Manufactured Material for the Purpose of Creating Non-Destructive Inspection Standards," USAF CRADA No. 18-AFIT-05, Collaborator: ATS-MER, LLC, Faculty Investigator: Dr. Glen Perram. Effective Date: 21 November 2017, Term: 24 months.

"Missile Development Concepts and Solutions -FY18," USAF CRADA No. 18-AFIT-06, Collaborator: Lockheed Martin Missiles and Fire Control, Faculty Investigator: Dr. Mark Reeder. Effective Date: 12 December 2017, Term: 25 months.

"NDA - Celestial Navigation by Means of Tracking Stars, Satellites and Ground Features," USAF CRADA No. 18-AFIT-07, Collaborator: BAE Systems IESI, Inc., Faculty Investigator: Maj Scott Pierce. Effective Date: 9 March 2018, Term: 12 months.

"Algorithm Development for Wide Field-Of-View (WFOV) Mission Data Processing," USAF CRADA No. 18-AFIT-09, Collaborator: Etegent Technologies, Ltd., Faculty Investigator: Dr. Kevin Gross. Effective Date: 10 August 2018, Term: 16 months.

"NDA - Gnowee and Coeus Software," USAF CRADA No. 18-AFIT-10, Collaborator: TAU Technologies, Inc., Faculty Investigator: Capt James Bivens. Effective Date: 10 August 2018 Term: 12 months.

7.2. EDUCATIONAL PARTNERSHIP AGREEMENTS

"EPA - Aerospace Research Program and Liaison," USAF CRADA No. AFIT EPA 2018-01, Collaborator: Ohio Aerospace Institute (OAI), Faculty Investigator: Dr. Heidi Ries. Effective Date: 12 April 2018, Term: 60 months.

"EPA - Equipment Donation," USAF CRADA No. AFIT EPA 2018-02, Collaborator: Wright State University, Faculty Investigator: Dr. Willie Harper. Effective Date: 5 July 2018, Term: 12 months.

7.3. PATENTS

PATENT APPLICATIONS

Generation of Vector Partially Coherent Optica Sources Using Phase-Only Spatial Light Modulators

AFD- 1689P, Application No. 62/577,430

Maj Milo Hyde, Santasri Bose-Pillai

Design for an electro-optic testbed utilizing a dynamic range gated Rayleigh beacon for atmospheric turbulence profiling

AFD-1721P; Application Number 62/592,059

Steven Zuraski, Elizabeth Beecher, Dr Steven Fiorino (AFIT), Jason Schmidt, Jack McCrae (AFIT), Nathan Figlewski

Segmented control of Electrostatically Actuated Bi-Morph Beams

AFD-1754P, Application No. 62/587,734

John Walton, Dr Lavern Starman, Robert Lake (AFIT), Kullen Waggoner (AFIT)

Water Treatment System- Cylindrical Teflon Reactor Containing Ultraviolet Light Emitting Diodes

AFD-1708, Application No. 15/902/003

Morgan Russel, John Stubbs (AFIT), Lt Col David Kempisty (AFIT)

Method for Recovering Full Polarization Radar Data from a Subset of Polarization Channel Measurements

AFD-1804, Application No. 62/633,928

Dr. Julie Jackson (AFIT), Forest Lee-Elkin

Diode pumped alkali laser extended to novel wavelengths via two-photon pumping

AFD-1768P, Application No. 62/718,516

Dr Glen Perram (AFIT), Dr Christopher Rice (AFIT), Nathan Haluska (AFIT)

PATENTS AWARDED

Clark, M., Hopkinson, K.M., Transferable Multiparty Computation, Patent Application # 14/708,532 – 11 May 2015.

Provides a method for multiparty computation where computational shares can be transferred to secondary parties based on a trigger event in a way that preserves privacy/security while simultaneously distributing the computational workload to aid in scalability. Patent Awarded November 7, 2017, Patent No. 9,813,234. Market Acceptance: TBD.

Ninan, A., Wan, C.C, Kunkel, T. and Miller, M.E. (2017). Quantum dot/remote phosphor display system improvements, United States Patent 9,746,157.

INVENTION DISCLOSURES

A method for characterizing atmospheric full-electromagnetic spectrum propagation performance in an expeditionary setting using 4-D numerical weather prediction (NWP) data fields. Filed at SPAWAR, Pacific, September 2018.

Inventors: Hallenborg, Hammel, Wiss, Holt, Frederickson, Fiorino, Flagg, Haack, Campbell, Rogers, Horgan, Wang, McBryde, and Gordon.

Method for Recovering Full Polarization Radar Data from a Subset of Polarization Channel Measurements

AFD—1804, 17 Jan 18

Mr. Forest Lee-Elkin (not AFIT) & Dr. Julie Jackson.

Spring-Loaded Rub Sealing for Wave Disk Engine

AFD-1878, 13 Aug 18

Pejman Akbari, Mr. Brian Sell, Dr. Marc Polanka, Mr Christopher Tait.

APPENDICES

APPENDIX A: POST-DOCTORAL AND OTHER RESEARCH ASSOCIATES' CREDENTIALS

BRECKLING, SEAN R.,

Post-Doctoral Research Associate (through ORISE), Department of Mathematics and Statistics, AFIT, Appointment Date: 2017 (AFIT/ENC); BS University of Wisconsin-Milwaukee (2010), PhD University of Nevada, Las Vegas (2017). Dr. Breckling's research interests include the numerical analysis of partial differential equations. His current research includes finite element analysis of perturbation models of the Navier Stokes equations, specifically in their ability to accurately resolve incompressible multi-physics flows at high Reynolds numbers. Tel. 937-255-6565 x4722, email: sean.breckling.ctr@afit.edu

BURDSALL, ADAM C.,

Post-Doctoral Fellow (through ORISE), AFIT Appointment Date: 2018 (AFIT/ENV); BS, Geology, Wittenberg University, 2011; MS, Earth and Environmental Sciences, Wright State University, 2013; PhD, Environmental Science, Wright State University, 2018. Dr. Burdsall's work is focused on bioaerosol emission and the treatment of nitroaromatic pollutants with UV-LEDs and advanced oxidation. Tel. 937-255-3636 x4648, email: Adam.Burdsall.ctr@afit.edu

COBB, GREGORY R.,

Oak Ridge Institute for Science and Education Fellow, AFIT Appointment Date: 2017 (AFIT/ENV); BS, Chemical Engineering, The Ohio State University, 2008; MS, Engineering, University of Washington, 2013. Mr. Cobb's work is focused on characterizing novel materials, including additively manufactured metals and carbon nanotube-based materials. Tel. 937-255-3636 x4752, email: gregory.cobb.ctr@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Cobb, G., Lingenfelter, A., Nesmith, A., and O'Hara, R., "Vibrational Properties of Additively Manufactured Inconel 718", 56th AIAA Aerospace Sciences Meeting, AIAA 2018-0489, 2018

DENNEY, JACOB M.,

SOCHE Graduate Research Intern, AFIT Appointment Date: 2018 (AFIT/ENV); BS, Chemical and Biological Engineering, Colorado State University, 2017; MS, Materials Science and Engineering, Wright State University, expected graduation 2018. Jacob Denney's work is focused on the modeling and analysis of municipal solid waste to energy systems. Email: Jacob.Denney.ctr@afit.edu

DESENTZ, DEREK G.,

AFIT Appointment Date: 2016 (AFIT/ENV); BS Expected 2019, Computer Science, Wright State University (USA). Mr. Dentz's work is focused on developing artificial agents in human-agent teaming environments in support of AFOSR sponsored research. Email: derek.desentz.ctr@afit.edu

DOANE, BENJAMIN M.,

Research Assistant, AFIT Appointment Date: 2013 (AFIT/ENV); BS, Biological Sciences, Wright State University, 2009; MS, Environmental Engineering, Air Force Institute of Technology, 2015. Mr. Doane's work is focused on designing and engineering metal and polymer additively manufactured parts. Tel. 937-255-3636 x4700, email: Benjamin.Doane@afit.edu

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Doane, B., Kan, L., O'Hara, R.P., Hartsfield, C., "Case Study: Cooling channels for material testing applications using Laser Powder Bed Fusion," Metal Additive Manufacturing, 4 (1), 147-153, 2018.

DOBOSZCZAK, STEFAN B.,

Post-Doctoral Research Associate (through ORISE), Department of Mathematics and Statistics, AFIT, Appointment Date: 2016 (AFIT/ENC); BS, Rensselaer Polytechnic Institute, 2010; PhD, University of Maryland - College Park, 2016. Dr. Doboszczak's research interests include partial differential equations, compressible fluids, multiphase flows, and problems on moving domains. His current research is on applications of control theory for compressible fluids. Tel. 937-255-3636 x4414, email: stefan.doboszczak.ctr@afit.edu

REFEREED JOURNAL PUBLICATIONS

Doboszczak, S., Mohan, M., and Sritharan, S., Existence of optimal controls for compressible fluid dynamics, *Journal of Mathematical Fluid Mechanics* Vol. 20, No. 1, pp.199-211, 2018.

ENGLE, NICHOLAS,

AFIT Appointment Date: 2017 (AFIT/ENV); BS Expected 2021, Computer Science, University of Cincinnati (USA). Mr. Engle's work is focused on developing databases of human interactions within naturalistic simulations to support operator state assessment.

JOHNSON, STEVE R.,

Master of Business Administration (MBA), Kent State University, Kent Ohio, 1994.
Bachelor of Business Administration (BBA,) Majoring in Finance, Kent State University, Kent Ohio, 1992.
Steve is currently working on an alerting and analytics system for supply chain issues. Tel. 513-317-8189, email: steve.johnson.ctr@afit.edu

KABRE, JULIENNE

Post-Doctoral Research Associate (through ORISE), Department of Mathematics and Statistics, AFIT, Appointment Date: 2017 (AFIT/ENC); BS, University of Ouagadougou, 1995; MS, Chicago State University, 2012; PhD, Illinois Institute of Technology, 2017. Dr. Kabre's research interests include numerical analysis of partial differential equations, mathematical modeling and statistical analysis. Her current research is on radial basis function analysis with application to high energy lasers. Tel. 937-255-3636 x4516, email: julienne.kabre.ctr@afit.edu

KANEL, SUSHIL R.,

Research Grants Engineer (RGE), AFIT Appointment Date: 2010 (AFIT/ENR); BE, Civil Engineering, Tribhuvan University (Nepal), 1992; MS, Environmental Science and Engineering, Gwangju Institute of Science and Technology (GIST) (South Korea), 2001; PhD, Environmental Science and Engineering, GIST (South Korea), 2006. Since August 2015, in addition to his RGE duties, Dr. Kanel has assisted AFIT faculty and students in the field of environmental and material research (physical chemical treatment, fate and transport of nanomaterials in the subsurface, as well as the application of nanomaterials for various purposes including water remediation). Tel. 937-255-3636 x4545, email: Sushil.Kanel@afit.edu.

REFEREED JOURNAL PUBLICATIONS

Russell, M., Kempisty, D., Kurwadkar, S., Kanel, S. R., Kurwadkar, S., Brittle, S. W., Sizemore, I., Yaal, L.
Destruction of aqueous phase organic pollutants using ultraviolet light emitting diodes and photocatalysis, *Water Air Soil Pollution*, 2018, 229,139.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Kanel, S. R., Sizemore, I., Kempisty, D., Goltz, M, Treatment of nitroaromatic explosives-contaminated water in aqueous phase by nano-sized carbon nanotube yarn, 255th ACS National Meeting, New Orleans, LA, USA, March 18-22, 2018.

LIU, BERT C.,

Post-Doctoral Research Associate, AFIT Appointment Date: 2017 (AFIT/ENY); BS, Chemical Engineering, University of California – Los Angeles, 2010; PhD, Materials Science & Engineering, The Ohio State University, 2016. Dr. Liu is a hands-on Materials Research Scientist with 6 years of experience in solid-state welding, high-speed impact, and characterization of structure-property relationships of metals. His accomplishments include welding 8 “unweldable” dissimilar metal combinations

and welding a peak-aged high-strength steel with miniscule adverse thermal effect. Tel. 937-785-3636 x4644, email: bert.liu.ctr@afit.edu

REFEREED JOURNAL PUBLICATIONS

Liu, B., Vivek, A., Presley, M., & Daehn, G. S. "Dissimilar Impact Welding of 6111-T4, 5052-H32 Aluminum Alloys to 22MnB5, DP980 Steels and the Structure–Property Relationship of a Strongly Bonded Interface." *Metallurgical and Materials Transactions A*, 49(3), 899-907. 2018

Liu, B., Vivek, A., & Daehn, G. S. "Joining sheet aluminum AA6061-T4 to cast magnesium AM60B by vaporizing foil actuator welding: Input energy, interface, and strength." *Journal of Manufacturing Processes*, 30, 75-82. 2017

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Liu, B. C., Palazotto, A., Vivek, A., & Daehn, G. (2018). "Impact welding of wrought and additively manufactured 15-5 PH stainless steel." In 2018 AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference (p. 0488).

Liu, B., Palazotto, A., Vivek, G., and Doehn, G., "Impact Welding of Wrought and Additively Manufactured 15-5 PH Stainless Steel", presented at AIAA SciTech 2018, Kissimmee, FL, AIAA-2018-0488, January 8-12, 2018.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Liu, B., Palazotto, A., and Doehn, G., "Impact Welding for Rapped Repair of Heat Treated Components", presented at the 43rd Dayton-Cincinnati Aerospace Science Symposium, Sinclair Conference Center, Dayton, OH. February, 27, 2018.

Liu, B., Palazotto, A., and Zupta, V., "Interfacial Morphology of Impact Welding, Additive Manufactured 25-5 Stainless Steel", presented at the ASCE Engineering Mechanic Institute Conference, MIT, Boston, Mass., May, 29-June, 1, 2018.

Liu, B., Palazotto, A., and Doehn, G., "Impact Welding of Dissimilar Material Combinations of an Additive Manufactured Material", Presented at the 10th Annual ASME Dayton Engineering Science Symposium, WSU, October, 2017.

LOMANNO, CHRISTOPHER P.,

Research Engineer, AFIT Appointment Date: 2010 (AFIT/ENG); BS, Electrical Engineering, University of Dayton, 2010. Mr. Lomanno's work is focused on CubeSat software architecture, payload integration, and satellite communications. Tel. 937-255-3636 x4746, email: Christopher.Lomanno@afit.edu

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Choe, K., Lomanno, C., "Total Ionizing Dose Effects in NVIDIA Jetson TX2I Modules Test Report", Dayton, 2018

MANGEN, MATTHEW L.,

Mr. Mangen is a Course Manager for the AFIT Civil Engineer School (through IBM). He earned his BSBA from Ohio Northern University in 2014. Mr. Mangen's research interests include the truck driving industry, industry 4.0, and data analytics. His current research is on an approach to alleviating the truck driver shortage. Tel. 937-255-3636 x4361, email: matthew.mangen.ctr@afit.edu

McGUIRL, JOHN M.,

AFIT Appointment Date: 2018 (AFIT/ENV); PhD, Cognitive Systems Engineering, The Ohio State University (2008); BS, Electrical Engineering, University of Massachusetts, 1999. Dr. McGuirl's work is focused on improving Joint Cognitive Systems which employ human and artificial agents collaborating together in a shared context to achieve human-centered goals. Tel. 614-551-1822, email: john.mcguirl.ctr@afit.edu

MEYER, DAVID W.,

Research Associate, AFIT Appointment Date: 2014 (AFIT/ENY); BS, Mechanical Engineering, the Ohio State University, 1987; MS, Mechanical Engineering, Naval Postgraduate School, 1992; MS, Operations Research, Naval Postgraduate School, 2007. Mr. Meyer is the Modeling and Simulation Team Lead for the Center for Space Research and Assurance with an emphasis on modeling of dynamic space scenarios and using high performance computers. Tel. 937-255-3636 x4512, email: David.Meyer@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Trade-Studies for GEO Space Situational Awareness using High-Performance Computing.” Sponsor: AFRL/RV. Funding: \$55,500. [CSRA]

REFEREED JOURNAL PUBLICATIONS

Stern, J.L., Wachtel, S.T., Colombi, J.M., Meyer, D.W., and Cobb, R.G., “Multi-objective Parallel Optimization of Geosynchronous Space Situational Awareness Architectures.” *AIAA Journal of Spacecraft and Rockets*, <https://doi.org/10.2514/1.A34043>, 2018

Felten, M.S., Colombi, J.M., Cobb, R.G. and Meyer, D.W., “Multi-objective optimization using parallel simulation for space situational awareness,” *Journal of Defense Modeling and Simulation* (JDMS). 2018, <https://doi.org/10.1177/1548512918803212>

Bateman, Jr., M.G., Colombi, J.M., Cobb, R.G. and Meyer, D.W., “Exploring Alternatives for Geosynchronous Orbit Space Situational Awareness,” *Journal, Military Operations Research* (MOR). 2018

Ford, T., Meyer, D.W., Colombi, J.M., Scheller, B., and Palmer, C., “A Method of Assessing Time-Variant Value of Multi-Domain Architectures.” *Journal of Defense Modeling and Simulation*. Volume 15 (4), 2018 <http://dms.sagepub.com/content/early/2016/06/29/1548512916656291.full.pdf>

MILLER, SEAN K.,

General Schedule - Research Assistant, AFIT Appointment Date: 2006 (AFIT/ENY); AS, Electrical Engineering, Sinclair Community College, 2011. Mr. Miller's work is focused on leading the development of a space qualified 6U CubeSat bus architecture “GRISSOM” for the satellite design course sequence. In addition, Mr. Miller is heading the development of a space to ground software defined radio communications system. Tel. 937-255-3636 x7512, email: Sean.Miller@afit.edu

MUKHERJEE, CHANDRANI,

Post-Doctoral Fellow (through ORISE), AFIT Appointment Date: September 2018 (AFIT/ENV); BSc Honours, Chemistry, University of Delhi (India), 1999; MSc, Organic Chemistry, University of Delhi, 2001; PhD, Organic and Bioorganic Chemistry, University of Delhi, 2006; Postdoctoral Fellow, Acadia University (Canada), 2007; Post Doctoral Fellow, Johns Hopkins University (USA), Department of Pharmacology, 2012; Patent Analyst, CPA Global (Former Landon IP), 2018. Dr Mukherjee's work is focused on the solid waste to energy technologies and analysis of air and water pollutants. Tel. 410-218-0015, email: chandranitm@gmail.com

RANLY, NEIL C.,

Research Associate, Center of Operational Analysis (COA), AFIT; BS, University of Dayton, 2004; MS, University of Dayton, 2009; PhD, Air Force Institute of Technology, 2018. Dr. Ranly's research interests include decision analysis, data strategies for continuous process optimization, and semantic knowledge capture techniques. He is currently researching data issues for reliability modeling and value-of-information techniques for information-production management. Tel. 937-255-3636 x4496, email: neil.ranly.ctr@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Ranly, N, Weir, J D, Colombi, J, and Tucholski, H, “Information production planning with multiple information users and aging information products,” Proceedings of the 2018 IISE Annual Conference May 21, 2018, Orlando, Florida, USA.

SABELKIN, VOLODYMYR P.,

Oak Ridge Institute for Science and Education Fellow, AFIT Appointment Date: 2018 (AFIT/ENY); Ph.D., 1980; Dr. Sci, 1989, Aircraft Engineering, Kharkov Aviation Institute, Ukraine. Dr. Sabelkin's work is focused on creep, fatigue, crack propagation in metallic alloys and ceramic matrix composite materials under room, sea water and high temperature conditions including harsh space, combustion and localized corrosive environments. Dr. Sabelkin's research is focused on characterizing novel materials, including additively manufactured metals, composite materials, ceramics, carbon nanotube-based materials, fatigue of materials. Tel. 937-255-3636 x7476, email: volodymyr.sabelkin.ctr@afit.edu

REFEREED JOURNAL PUBLICATIONS

Sabelkin V, Mall S, Misak H, "Corrosion fatigue of coated AISI 4340 high strength steel with dent damage," *Fatigue and Fracture of Engineering Materials and Structures*, Volume 41 (3), Oct 2017. DOI:10.1111/ffe.12725.

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Research Assistant, AFIT Appointment Date: 2016 (AFIT/ENY); BS, Mechanical Engineering, University of Dayton, 2013; MS, Materials Science & Engineering, University of Dayton, 2015. He is currently engaged in the characterization and optimization of additive manufacturing for low earth orbit space applications. Tel. 937-255-3636 x4628, email: travis.shelton@afit.edu

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Research Assistant, AFIT Appointment Date: 2013 (AFIT/ENY); AS, Mechanical Engineering Technology (MET), Sinclair Community College (2011); BA, Mechanical Engineering Technology (MCT), University of Dayton (2014); Member of Sinclair Community College MET Board of Alumni Advisors (current); Past adjunct faculty, Sinclair Community College (2011); Past member of Centerville High School Engineering Advisory Board (2010); Mr Smith has over 6 years experience in machining operations relating to industrial components and processing, 4 years experience with streamlining production of curriculum-based electric guitars under the authority of Sinclair Community College, 1-1/2 years experience with automotive tooling design, and 5 years experience with satellite structural design, control systems implementation, and sensor and component integration. Philip also provides CAD instruction and design techniques to AFIT faculty and students, Wright-Patterson AFB researchers, and Wright-Patterson AFB machine shop personnel. Tel. 937-255-3636 x7531, email: philip.smith@afit.edu

EDITORSHIPS IN PROFESSIONAL JOURNALS

Technical contributor; Planetary Systems Corp., Silver Springs, Maryland; Payload Spec for 3U 6U 12U: Engineering development document for implementation of cubesat payloads into a canisterized launch dispenser.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Mecahnical lead for AFIT's Space Obeject Self-Tracker (SOS) cubesat due for launch Spring 2019 on SpaceX's Falcon Heavy.

Mecahnical lead for AFIT's Skypad payload on USAFA's Falconsat 8 due for launch 2019.

Mechanical lead for AFIT's Grissom project, an Air Force 6U cubesat bus with the capability to host payloads on demand.

WILLIAMS, JADA B.,

AFIT Appointment Date: 2018 (AFIT/ENV); BS, Geoenvironmental Studies, Shippensburg University (USA), 2012; MS, Renewable and Clean Energy, University of Dayton (USA), 2015. Ms. Williams' work is focused on developing masters-level energy systems engineering education material as well as assisting both students and faculty with interdisciplinary energy system design research projects and the systems engineering aspect of emerging energy sources. Tel. 937-320-9970 x4890, email: Jada.Williams.ctr@afit.edu

APPENDIX B: SELECTED ACRONYM LIST

There are a number of abbreviations for organizations that are used in this report. This alphabetical listing includes only selected organizations.

711 HPW/RH	711 th Human Performance Wing Human Effectiveness Directorate
ACC	Air Combat Command
AETC	Air Education and Training Command
AFCAA	Air Force Cost Analysis Agency
AFCEC	Air Force Civil Engineering Center
AFGSC	Air Force Global Strike Command
AFIA	Air Force Inspection Agency
AFIMSC	Air Force Installation and Mission Support Center
AFIT	Air Force Institute of Technology
AFLCMC	Air Force Life Cycle Management Center
AFMC	Air Force Materiel Command
AFMOA	Air Force Medical Operations Agency
AFNWC	Air Force Nuclear Weapons Center
AFRL	Air Force Research Laboratory
AFRL/AFOSR	AFRL/Air Force Office of Scientific Research
AFRL/RD	AFRL/Directed Energy Directorate
AFRL/RI	AFRL/Information Directorate
AFRL/RQ	AFRL/Aerospace Systems Directorate
AFRL/RV	AFRL/Space Vehicles Directorate
AFRL/RW	AFRL/Munitions Directorate
AFRL/RX	AFRL/Materials and Manufacturing Directorate
AFRL/RY	AFRL/Sensors Directorate
AFSC	Air Force Sustainment Center
AFSPC	Air Force Space Command
AFTAC	Air Force Technical Applications Center
AFTPS	Air Force Test Pilot School
AIAA	American Institute of Aeronautics and Astronautics
AMC	Air Mobility Command
ASEE	American Society for Engineering Education
DAGSI	Dayton Area Graduate Studies Institute
DARPA	Defense Advanced Research Projects Agency
DEJTO	Directed Energy Joint Technology Office
DHS	Department of Homeland Security
DOD	Department of Defense
DOE	Department of Energy
DTRA	Defense Threat Reduction Agency
EPA	Environment Protection Agency
ERDC	Engineer Research and Development Center
EUCOM	United States European Command
IEEE	Institute of Electrical and Electronics Engineers
INCOSE	International Council on Systems Engineering
JASPO	Joint Aircraft Survivability Program Office
JTWC	Joint Typhoon Warning Center
JWAC	Joint Warfare Analysis Center
MIT	Los Alamos National Laboratory
LTS	Laboratory for Telecommunications Sciences
MDA	Missile Defense Agency
MIT	Massachusetts Institute of Technology
MORS	Military Operations Research Society
NASA	National Aeronautics and Space Administration
NASIC	National Air and Space Intelligence Center

NAVAIR	Naval Air Systems Command
NGA	National Geospatial-Intelligence Agency
NNSA	National Nuclear Security Administration
NPS	Naval Postgraduate School
NSA	National Security Agency
NSF	National Science Foundation
OSD	Office of the Secretary of Defense
SAF	Office of the Secretary of the Air Force
SCOW	635 Supply Chain Operations Wing
SMC	Space and Missiles Systems Center
SOCHE	Southwestern Ohio Council for Higher Education
SPIE	The International Society for Optical Engineering
TuAF	Turkish Air Force
USAF	United States Air Force
USAFA	United States Air Force Academy
USSOCOM	United States Special Operations Command
USTRANSCOM	United States Transportation Command
WPAFB	Wright-Patterson Air Force Base

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